AVIATION WEEK

July 31, 1950

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Ask the men who KNOW L-M high intensity runway lighting

Ask airport managers, airline men, and pilots who use and know L-M high intensity runway lighting. They can tell you from their own experiences and observation how important it is to have the 180,000 beam candle power, the freedom from halo and glare, that only L-M lighting offers, with its extremely high intensity and controllable beam. Then ask the L-M Field Engineer for details or write Airport Lighting Division, Line Material Co., East Stroudsburg, Pennsylvania (a McGraw Electric Company Division).

Francis Fox at Worcester KNOWS!

Worcester, Mass., was one of the first city-owned airports with L-M High Intensity Lighting on all runways. Manager Francis T. Fox and members of the City Airport Commission made a very careful check of lighting and the experience of other airport managers before the decision was made. Captain Fox, a pilot himself, recently told us: "We've had nearly three years of operation now with high intensity lights on all runways. Our experience has convinced us that our choice was a wise one, and our lights have proved their value with better operations in all kinds of weather."

L-M's 180,000 cp. high intensity runway light with the famous controllable beam.

J. E. Hightower at Knoxville KNOWS!

"Here in the Tennessee mountains, we get all kinds of weather," says J. E. Hightower, manager of Knoxville's McGhee Tyson Airport. "And not all of it is good flying weather. So we are very much concerned with the high penetration of our lights, so that we can give the pilot the best possible delineation of the runway. Our experience with the lights has been most gratifying, and an important factor in maintaining a good safety record here."

Vic Dallin at Philadelphia KNOWS!

"Whenever other eastern airports are closed by weather and our Philadelphia International Airport is marginal, all pilots appreciate the great advantage of the controllable beam high intensity runway lights," says J. Victor Dallin, chief of Philadelphia's Bureau of Aeronautics. "We have had as many as 79 airliners in a single day take refuge here due to weather conditions. We are presently extending our instrument runway another two thousand feet and naturally this extension will be equipped with these lights."

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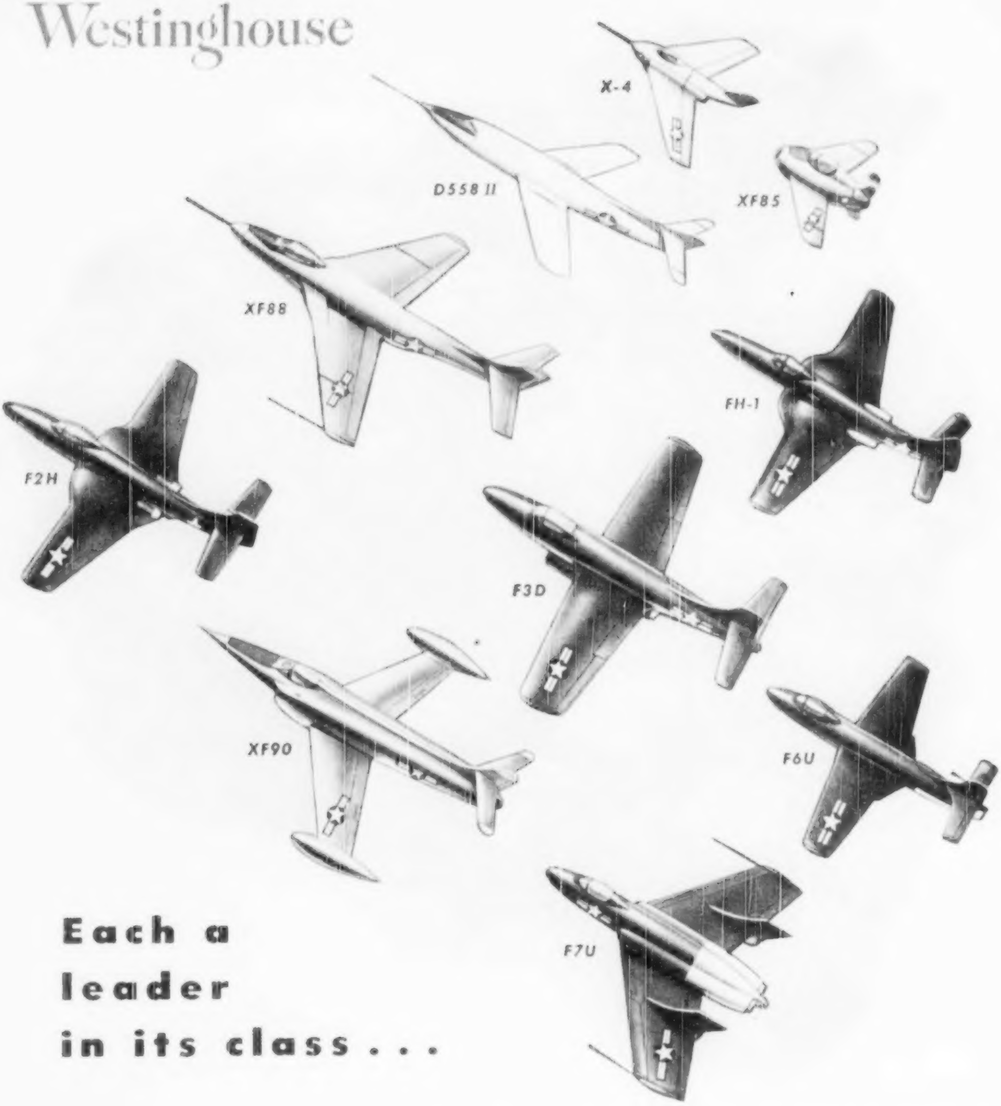
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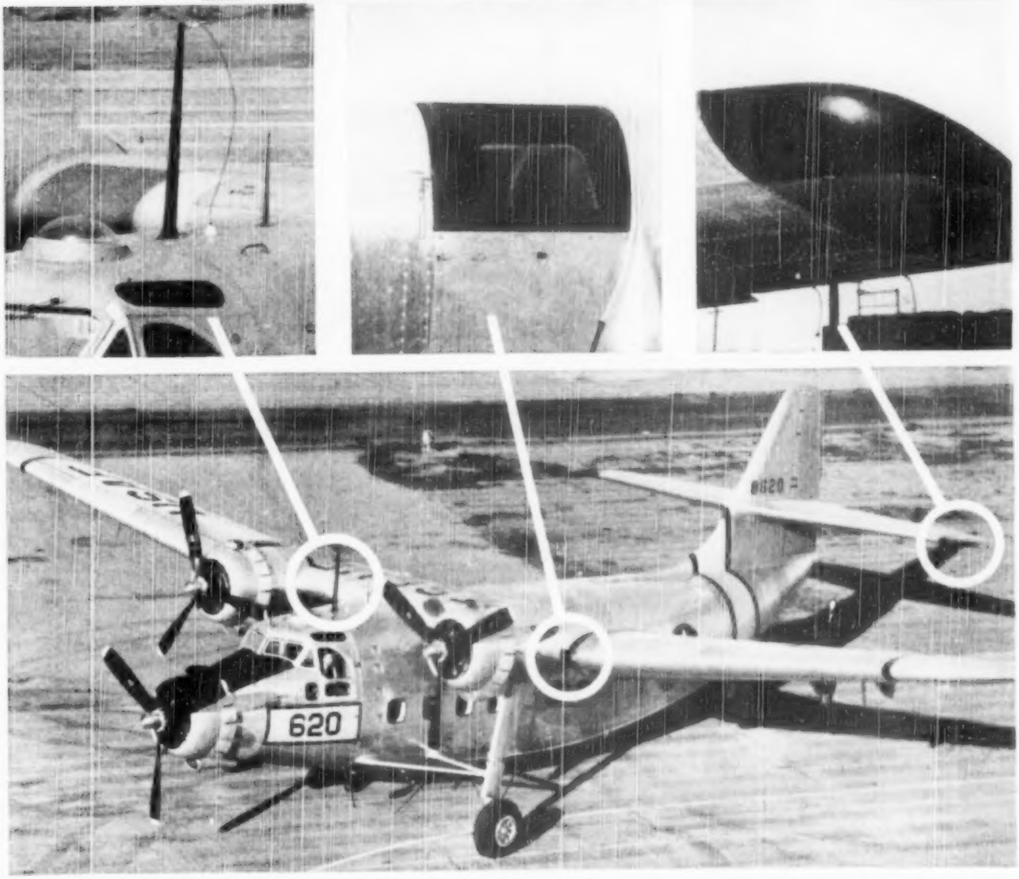
AVIATION GAS TURBINES

B.F.Goodrich



Electric blankets keep new Arctic plane from freezing

THIS NEW TRANSPORT, now in production for the military services, has an icy job cut out for it—rescue missions in the Arctic!

Because of the constant cold-weather operation, Northrop had to design the C-125 "Raider" against freezing at all vital points. They called in B. F. Goodrich—the leader in icing research. BFG engineers came up with the answer—an electric "blanket" made in three different shapes to solve three big icing problems!

The "blanket" is thin, tough rubber with a core of resistance wires running through it to supply spot heat. It's used on the radio antenna (photo top left) to keep ice from forming and causing the antenna to snap off in the wind. On the air scoops (photo top center), it keeps ice from choking off the air supply. Heat furnished by BFG electric rubber on the elevator horns (photo top right) keeps them from freezing tight, insures easy control.

Fitting B. F. Goodrich electric rubber to these three widely-different shapes proved to be no great problem.

It fits curved contours like a snug smooth glove. What's more, it's the most efficient way to put the right amount of anti-icing heat on the right spot. It's light-weight and simple, too. Two lead wires carry the electricity furnished by the plane's regular power supply.

Whenever you have an icing problem get in touch with *The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.*

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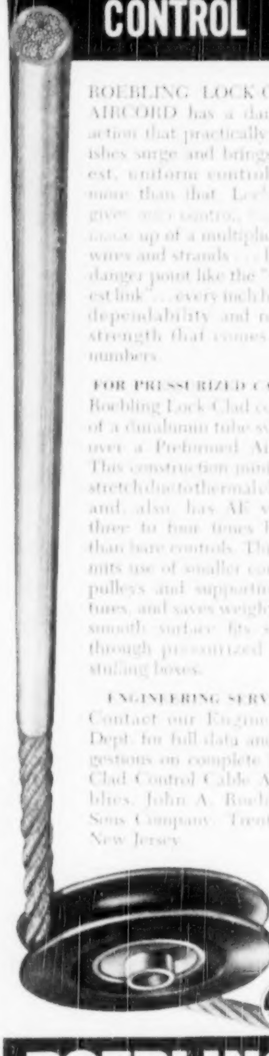

ROEBLING LOCK-CLAD AIRCORD has a damping action that practically abolishes surge and brings easiest, uniform control. But more than that, Lock-Clad gives [illegible] control, [illegible] it is made up of a multiplicity of wires and strands . . . has no danger point like the "weakest link" . . . every inch has the dependability and reserve strength that comes from numbers.

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Roebling Lock-Clad consists of a duralumin tube swaged over a Preformed Aircord. This construction minimizes stretch due to thermal change and, also, has AE values three to four times higher than bare controls. This permits use of smaller controls, pulleys and supporting fixtures, and saves weight. The smooth surface fits snugly through pressurized cabin stuffing boxes.

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Aviation Week

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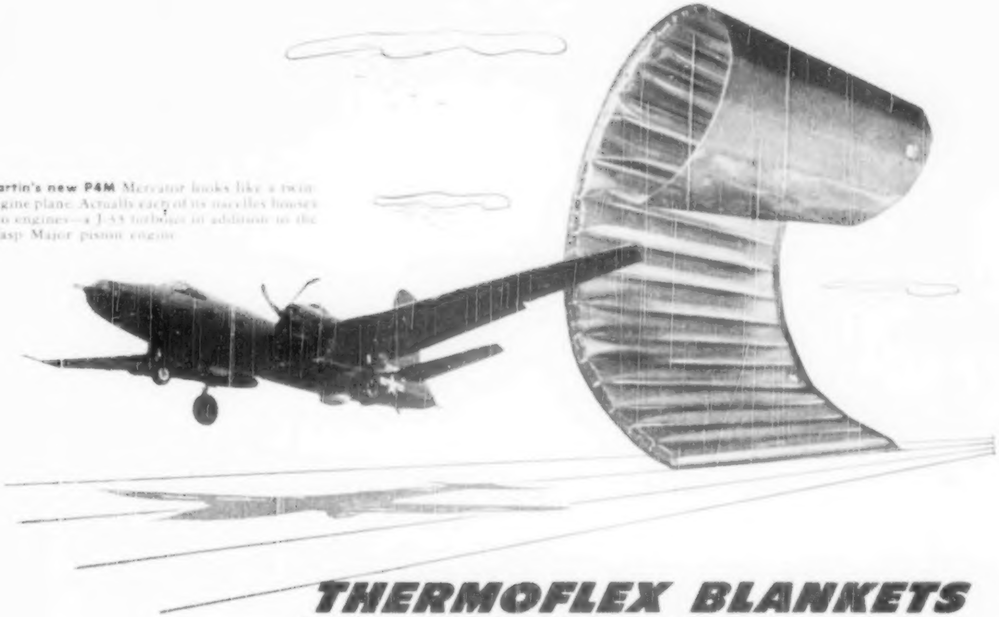
Aviation Week July 31, 1950 Vol. 53, No. 5

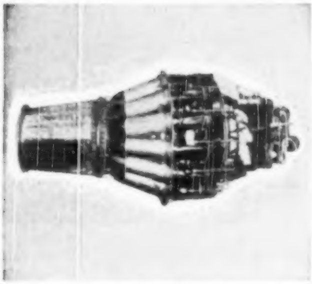
McGRAW-HILL PUBLISHING CO., Inc., James H. McGraw (1860-1948), Founder. Publication office—99-129 N. Broadway, Albany, N. Y. [illegible]

Martin's new P4M Mercator looks like a twin-engine plane. Actually each of its nacelles houses two engines—a J-33 turbojet in addition to the Wasp Major piston engine.



THERMOFLEX BLANKETS

. . . insulate engine cones of Martin P4M "Mercator"



J-M Thermoflex Insulation Blanket applied to exhaust cone of the J-33 turbojet engine used in the Mercator. This light weight, flexible insulation both protects adjacent parts of the plane from the intense heat and contributes to the efficiency of the jet propulsion.

SHIELDING the air frame of this new Navy plane against the intense heat generated during takeoffs and high speed runs under jet power was a problem that called for insulation of a very special kind.

The answer was found—as it has been for most other current model jet-powered planes—in Johns-Manville Thermoflex Insulation Blankets.

These flexible blankets have all the physical and thermal characteristics necessary to meet the critical insulation requirements of jet design. The Thermoflex felt has a density of 3 lb. per cu. ft. and, at 800 F. mean temperature, a conductivity of only 0.76*. This felt is sealed between sheets of corrosion-resistant Inconel or stainless steel foils to prevent the penetration of oil. The complete blanket weighs as little as 0.30 pounds per sq. ft.

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Thermoflex Blankets are custom-made to insulate exhaust cones, tail pipes, turbine casings and after-burners of turbojet, turboprop and auxiliary power units. Other special designs are available for cabin heating and thermal de-icing units.

For further information, send for booklet AV-1A. Just use the coupon below.

*Btu in. per hr. per sq. ft. per degree F

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AW-7

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FOR THE AVIATION INDUSTRY

WHO'S WHERE

In the Front Office

Harold R. Harris, vp-general manager of American Overseas Airlines, will become vp in charge of Pan American World Airways' Atlantic services. Harris, who became a brigadier general in the ATC during World War II, began his aviation career during World War I. He joined Pan American-Grace in 1929 and AOA in 1945.

Tom Wolfe, recently retained by Pacific Airmotive Corp. to assist in domestic and international activities, has been named president of the company. Wolfe has been in aviation over a quarter of a century. Most recently he had been vp of PAA.

Maj. Robert Dodds is Canada's new controller of civil aviation. He had been supt. of airways and airports of the Canadian Dept. of Transport. He succeeds **A. D. McLean**, recently appointed to the air transport board.

Changes

► Among the manufacturers—**E. Eugene Henkel** has been named director of public relations for Fairchild E&A's Farmingdale divisions, including the Stratos Corp., Fairchild Engine division, Guided Missiles division and the Al-Fin division. . . . **M. N. Golovine** has been appointed director of aero sales for Armstrong Siddeley Motors, Ltd., of the Hawker Siddeley organization. Sales coordination manager of the Hawker Siddeley group is now **C. A. G. Hicks**.

Shell Oil Co. has named three new division managers for the Pacific coast: **F. M. Stewart**, Los Angeles; **E. L. Ellsworth**, San Francisco, and **F. L. Zeller** covering Seattle and Portland divisions. . . . **Henry G. Riter, IV**, is new asst. manager of Thomas A. Edison, Inc., instrument division.

► Among the Airlines—**M. G. (Dan) Beard** has been appointed chief engineer for American Airlines. . . . **Edward J. Doherty** has been named director of publicity for National Airlines. . . . **Caron E. Carlberg** has been made manager-plant and equipment engineering division for Northwest Airlines.

Paul R. Sidler, president of Brown Boveri Corp. of New York, recently was honored for 25 years of service with the parent organization, Brown Boveri & Co. Ltd., Baden, Switzerland. . . . **C. H. Schildhauer**, Capt., USNR (ret.) has been appointed aviation director of the Baltimore Assn. of Commerce. . . . **William H. White** has been appointed general chairman of the California Air Progress Clinic and Air Freight Fair to be held in Oakland Aug. 19-20.

► **Correction—Harold H. Warden** is newly appointed general sales manager of the Curtiss-Wright Propeller division. He was inadvertently described in this column July 17 as general manager of the division.

INDUSTRY OBSERVER

► General Electric, which pioneered the propeller turbine aircraft powerplant in this country with its TG-100, moved back into the turboprop field last week (unofficial sources said) by purchasing the huge Turbodyne engine and its manufacturing rights. The Turbodyne, expected to produce 10,000 equivalent shaft hp. when fitted with an adequate propeller, was developed by Northrop Aircraft Inc.

► McDonnell F-88 escort fighter was nominated by informed Washington sources last week as probably the "plane most likely to succeed" in the current escort fighter competition, on basis of performances in recent tests at Edwards AFB, Muroc, Calif. Senior Air Board is expected to make the final decision shortly.

► Only a few helicopters have seen service thus far in the Korean conflict. Navy Sikorsky HO3S-1s are being used for liaison service between carriers and for rescue patrols. A few Air Force Sikorsky H-5s are also understood to be assigned to the theater.

► Experiments by a number of leading oil companies seeking an "ideal" lubricating oil which would get thicker when heated, and thinner when chilled (reversing normal process), have met with "jelling" difficulties. Apparently the difficulties have caused the projects to be dropped.

► By-product of the recent visit by U.S. aviation company presidents to England was firming up of a number of international licensing and intercompany agreements. Among projects discussed: a licensing program on North American F-86s in Holland; Pratt & Whitney and Rolls-Royce interchange of technical information; and a new Swedish licensing program for Pratt & Whitney.

► CAA authorization is expected soon for testing Ethyl Corp.'s new SB-23 compound in cargo plane operations. The compound is designed to promote scavenging and reduce lead fouling in piston engines; is not expected to cause any corrosion difficulties. It was developed with assistance of research at University of Kentucky. Standard Oil Co. of Calif. received an order from Ethyl to make up one million gal. of airplane fuel containing the compound, but CAA refused to approve a trial run of the material in regular passenger airline runs, pending further tests.

► Industry reports persist that Boeing is probably the most likely future occupant of the Tulsa, Okla., aircraft plant used by Douglas in World War II.

► Newest version of the Boeing Stratofreighter four-engine military transport is the C-97C for which USAF has just ordered $887,222 worth of spare parts.

► NACA reports on supersonic propellers (AVIATION WEEK June 19, p. 12) predict important savings in the weight of the propeller and gearing. Also predicted are shorter and lighter landing gear for planes as a result of the new design trend toward smaller blade angles and very thin blade sections. The higher rotational speeds already proven possible with these new designs will make it possible to reduce propeller diameters to about half the present size, still getting equivalent power absorption. Proper selection of blade width and new means of calculating blade vibration cycles are expected to do much to overcome vibration and flutter problems at the higher speeds.

► Bristol's giant Brabazon I transport prototype is starting a series of endurance flight tests during which it is expected to fly over most parts of the United Kingdom, but the immediate program calls for no foreign long-distance flights. The three turboprop Brabazon IIs planned to follow are designed for 10-hr. nonstop London-New York service at 350 mph. cruising speed at 35,000 ft. Daily service is planned in each direction, one plane being held in standby.

► Evaluation of McDonnell XF-88 Voodoo jet-powered, penetrating escort fighter has been completed at Edwards AFB. Both models of the fighter (one with, one without afterburner) have been returned to the factory.

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AVIATION CALENDAR

Aug. 2-13—17th National Soaring Contest, Grand Prairie, Tex.

Aug. 7—Lions Club Air Meet, Sky Harbour Airport, Goderich, Ontario, Canada.

Aug. 7-18—Special two-week program on high temperature ceramics, Massachusetts Institute of Technology, Cambridge, Mass.

Aug. 7-20—1950 United States International Trade Fair, Chicago.

Aug. 14-16—National West Coast meeting of the Society of Automotive Engineers, Hotel Biltmore, Los Angeles.

Aug. 19—Tennessee air progress conference, Knoxville.

Aug. 19-20—California Air Freight Clinic, sponsored by Calif. Aeronautics Commission and Oakland Chamber of Commerce Aviation Committee, Oakland.

Aug. 25-27—Fourth Annual Air Force Assn. national convention, Hotel Statler, Boston.

Sept. 5-10—Eleventh flying display and exhibition, Society of British Aircraft Constructors, Farnborough airfield, England.

Sept. 7—Pratt & Whitney distributor operation and maintenance meeting, Pacific Airmotive Corp., Linden, N. J.

Sept. 9-10—Third annual convention of the California Wing of the Air Force Assn., Arrowhead Springs Hotel and Spa near San Bernardino, Calif.

Sept. 10-14—Instrument Society of America instrument conference and national exhibit, the Coliseum, Houston, Tex.

Sept. 12-14—Conference on ground facilities for air transportation, Massachusetts Institute of Technology, Cambridge, Mass.

Sept. 18-22—Fifth national instrument conference and exhibit, Memorial Auditorium, Buffalo, N. Y.

Sept. 25-27—1950 national electronics conference, Edgewater Beach Hotel, Chicago.

Sept. 27-30—Aeronautic meeting and aircraft engineering display, Society of Automotive Engineers, Hotel Biltmore, Los Angeles, Calif.

Sept. 28-30—14th annual convention of International Northwest Aviation Council, Sun Valley, Idaho.

Oct. 12-13—1950 conference on airport management and operations, Max Westheimer Field, North Campus, University of Oklahoma, Norman, Okla.

Oct. 16-20—1950 annual general meeting of the International Air Transport Assn., Fairmont Hotel, San Francisco.

Oct. 25-26—Flight Safety Foundation annual Safety Seminar, Denver, Colo.

Oct. 26-27—5th annual aviation conference, sponsored by aviation committee of Tucson Chamber of Commerce.

PICTURE CREDITS

12, 13—McGraw-Hill World News; 14—World Wide; 16 Convair; 22, 24—NACA; 27—Link Aviation Inc.; 28—McGraw-Hill World News.

NEWS DIGEST

DOMESTIC

Consolidated Vultee's San Diego division put about half of its 5000 employes on two ten-hour shifts Monday through Friday beginning July 27. The stepped-up work schedule will permit Convair to coordinate San Diego's B-36 modernization program with the Ft. Worth plant's B-36 delivery schedule. The latter went on two ten-hour shifts on a plantwide basis July 17.

Complete aircraft shipments in airframe weight, during May 1950 came to 5,583,500 lb., according to the Bureau of Census and CAA. U.S. military customers took 80 percent of the total. May shipments of civilian planes were 377 craft worth $7.8 million. May airframe plant employment was up slightly over the previous month—153,273 compared with 164,998.

Northwest Airlines may raise some of its 4-cents-a-mile coach fares to 4½ cents or more per mile. NWA's New York-Seattle coach rate would be increased from $99 to $110—the same fare as charged on transcontinental coach flights operated by American Airlines and TWA.

Aircoach Transport Assn. reports it has raised $25,000 of a projected $50,000 warchest to fight Civil Aeronautics Board restrictions on nonscheduled operations. The new irregular operators' group was organized in Miami last month.

ROBERT J. SMITH, President of Pioneer Air Lines, Dallas, has been nominated by President Truman as vice chairman of the National Security Resources Board. Smith was a colonel in the Air Transport Command during World War II and has since been promoted to brigadier general.

"Bumper," Army's two-stage rocket, was successfully fired on its second try at Cocoa, Fla., early last week. It was the first "horizontally" fired missile of the armed forces. The missile uses a captured German V-2 with a 15-ft., 700-lb. Wac Corporal missile implanted in the warhead. V-2 rose to 31,000 ft. There Wac Corporal took off horizontally and traveled an estimated 15 mi., reaching speed believed to be 5000 mph. V-2 was shattered by remote control detonation of TNT over the Atlantic. Wac Corporal dropped into the ocean.

FINANCIAL

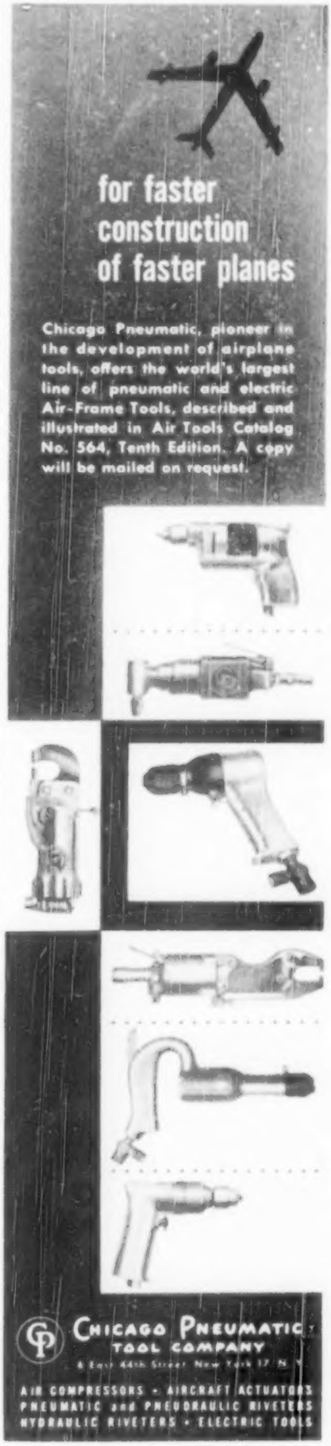
Lockheed Aircraft reports airplane sales about 50 percent higher for first six months of this year than for same period last year. Pending the company's regular audited mid-year statement, President Robert E. Gross said that Lockheed delivered 546 planes for an estimated sales total of $83 million during the first six months of 1950. This compares with 215 delivered in the same period of 1949 and 505 delivered in all of last year. Backlog has reached about $226,400,000.

American Airlines declared the regular quarterly dividend of $.875 per share on the company's $3.50 cumulative convertible preferred stock payable Sept. 1, 1950, to stockholders of record at the close of business Aug. 16, 1950.

North American Aviation reports an estimated net income of $5,157,000 after taxes for the period between Oct. 1, 1949-June 30, 1950. Sales and other income for this period amounted to $93,254,345. Unfilled orders at June 30, 1950, were $264,359,565.

General Electric announces a net profit of $77,445,000 for the company and affiliates for six months ended June 30. This is 66 percent increase over earnings in same period last year. Consolidated net sales billed during first six months of 1950 totaled $851,050,000.

Glenn L. Martin Co. reports a net income of $872,901 for first six months of this year on total sales deliveries and billings of $16,582,702. Undelivered orders at the end of 1950's second quarter increased to $94,422,000, not including some $27 million in new orders received since June 30.



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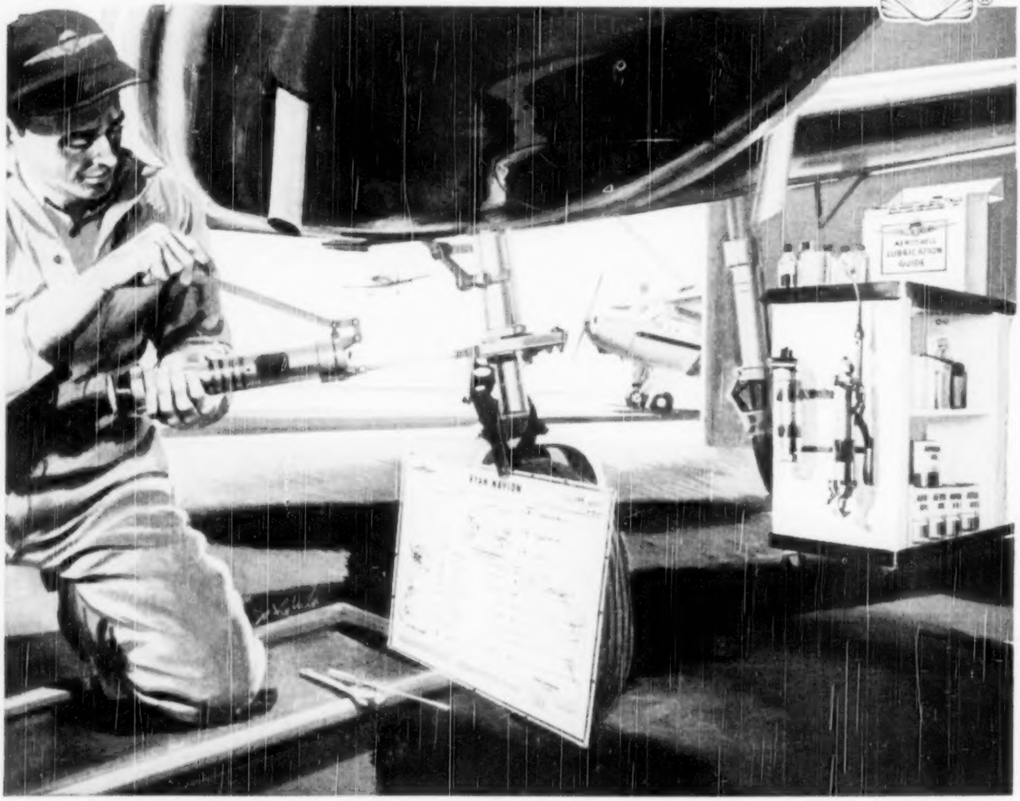


AVIATION WEEK

VOL. 53, NO. 5

JULY 31, 1950

1951 Airpower Budget: $5.6 Billion

Upward revision to $10.5 billion of President Truman's emergency appropriation request submitted in detail to Congress July 24, boosted totals for Air Force and Navy 1951 plane procurement above huge estimates of a week ago.

In terms of new military planes, the revised Truman request means this:

Air Force share	$4,535,400,000
Navy and Marine Corps share	$2,648,029,000
Army share	$3,063,547,000
For overall Defense Department activities	$240,000,000
Total appropriation request (military funds)	**$10,486,976,000**

For Procurement

Total allotted for new planes from emergency request	$3,344,600,000
Allocation already agreed upon by Congress for 1951 Air Force and Navy plane procurement	$2,298,600,000
Total now budgeted for 1951 military plane procurement	*$5,643,200,000*

Plans Rushed for Big Spending Program

Services charting procurement course; industry set to turn out more planes.

By Alexander McSurely

Air Force and Navy procurement planners last week were busy breaking down into usable contracting segments the $5.6-billion total now scheduled for 1951 Air Force and Naval aviation procurement. At the Pentagon, Navy building and at Wright Field, batteries of calculating machines groaned under the huge problems which were poured into them.

Top production planners of U.S. aircraft manufacturers juggled tiny scale models of machinery and certain plane types to finalize new larger-scale production lines for the vastly increased airpower requirements laid down July 24 by President Truman.

▶ **Prompt Action**—Prompt congressional action on the Truman revised request for $10.5-billion emergency appropriations was expected late last week, as the gravity of the Korean situation continued.

Analysis of the new request showed the Air Force was due to get $2.7 billion-plus and the Navy $0.6 billion-plus for planes. Air Force was already scheduled to receive $1.5 billion and the Navy $0.7 billion as agreed upon by the two Houses of Congress for the 1951 regular appropriation for the Defense Department.

So the addition of the two allocations would mean a total of $4.2 billion for Air Force plane procurement, plus $1.3 billion for Navy aviation procurement.

▶ **Allocations**—Here is how the Air Force total of $4,535,400,000 from the new request would be distributed: Plane procurement, $2,777,300,000; special procurement, $460,700,000; acquisition and construction of real property, $169,700,000; maintenance and operation, $799,100,000; military personnel, $307,000,000; salaries, expenses, administration, $21,600,000.

Only two items in the Navy allocations could be definitely picked out as aviation funds: Construction of aircraft and related procurement, $646,269,000, and aircraft and facilities, $149,078,000. But it was likely that a good part of the remaining Navy funds asked for, would find their way to Naval aviation, directly or indirectly. Navy total allocation was $2,648,029,000.

▶ **Liaison Planes**—Similarly, no items in the Army allocations shown could be directly related to aviation procurement, although it was understood that increases in liaison plane procurement were to be a part of the Army expansion.

It was difficult last week for Washington observers to assess the muddled aviation procurement situation in terms

Details of New Aviation Requests

Air Force

Construction of aircraft and related procurement	$2,777,300,000
Acquisition and construction of real property	169,700,000
Special procurement	460,700,000
Maintenance and operation	799,100,000
Personnel requirements	307,000,000
Salaries, expenses, administration	21,600,000
Total	$4,535,400,000

Naval Aviation

Aircraft and facilities	$149,078,000
Construction of aircraft and related procurement	$646,269,000

of individual companies and individual planes.

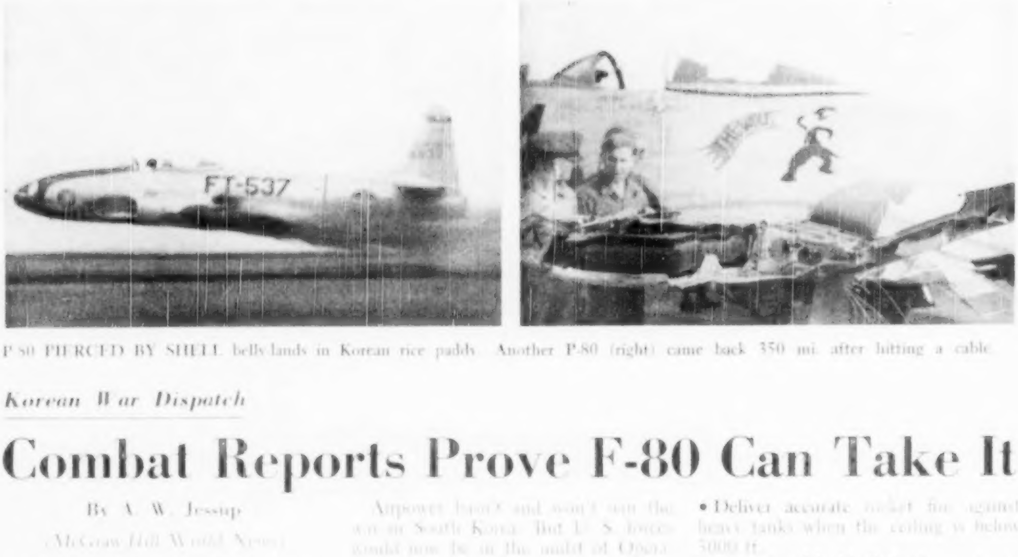
But there were these guideposts:

- **McDonnell Aircraft Corp.** announced it now holds $125 million in government contracts, and that its production would be at least doubled and perhaps tripled to meet new contracts, presumably mostly for Banshee Navy jet fighters, signed in the last few weeks.
- **Douglas Aircraft Co.** announced signing of a Navy contract for rebuilding 100 R4D cargo planes (counterpart of the DC-3 and C-47) into modernized versions, comparable to the Super DC-3.
- **Emphasis on the Boeing B-47 Stratojet** six-jet bomber in the new program is pointed up by the assignment of Col. Paul W. Tibbets Jr., to a new combined service test program on the plane at Wichita, for Air Materiel Command, Strategic Air Command and Air Proving Ground. Combined program is designed to speed production, and determine operational capabilities of the plane considered the world's fastest bomber. (Tibbets headed the secret bomb group which handled the Atom Bomb project, and he piloted the plane which dropped the bomb on Hiroshima.)
- **Westinghouse Electric Corp.**, one of the major jet engine makers, has announced readiness to begin conversion to full military production overnight, if necessary.
- **Republic Aircraft's** new sweptwing YF-96A, developed from the straight-wing F-84 jet fighter, was reported a likely candidate to get some escort fighter contracts on the basis of its adaptability to relatively early quantity production.
- **Further emphasis** on carrier-based Naval aviation appeared likely from definite indications that the Navy supercarrier, once scuttled by Defense Secretary Louis Johnson before its keel was laid, was definitely back in the Navy ship-planning picture. Whether it would be the same 65,000-ton carrier United States, or whether a somewhat smaller craft of the same flush-deck characteristics would take its place, was not yet clear.
- **Indications that the program** would call for expansion beyond presently occupied facilities was seen in the new higher degree of interest shown by industry presidents in such plants as the Tulsa and Marietta bomber plants. Donald Douglas stopped off at Tulsa to look at the plant his company occupied there in World War II, on his way to Washington to the McCone meeting, and told Tulsans he'd like to come back.
- **There was much speculation** in Washington about how much longer Defense Secretary Johnson could hold his job in the face of the rising tide of criticism of the economy program which had so far curtailed military strength. Congressional speeches lambasting Johnson were a nearly daily occurrence, with some speakers going so far as to suggest impeachment.

Industry company presidents, meeting with John A. McCone, under secretary of the Air Force, following President Truman's July 19 preliminary message to Congress, found little light shed on individual company responsibility, since the procurement picture was discussed only in general terms.

Overall, last week, the picture, confused as it was, seemed to bear out earlier forecasts for:

- **New emphasis** on tactical aviation, especially ground support planes and transports.
- **No slackening** but rather increased effort, on strategic bombers and jet interceptors.
- **Preference** usually to planes that can be put into operation at earliest possible dates, to bolster the relatively weak air forces in being.



F-80 PIERCED BY SHELL belly-lands in Korean rice paddy. Another F-80 (right) came back 350 mi. after hitting a cable.

Korean War Dispatch

Combat Reports Prove F-80 Can Take It

By A. W. Jessup

(McGraw-Hill World News)

An Air Base in Japan—The F-80 Shooting Star has passed its first combat tests with higher marks than the U. S. Air Force or Lockheed Aircraft Corp. expected. It has given close support to ground troops up to 400 miles from its operating base. It has taken a phenomenal amount of punishment and still come home. It has required less mechanical maintenance than in peacetime operation.

Airpower hasn't and won't win the war in South Korea. But U. S. forces would now be in the midst of Operation Dunkerque through Pusan if airpower, principally that of the F-80, had not slowed the rush of North Korean armored columns during the past week.

Without detracting from the F-80's performance, the action in Korea reveals the Air Force's need for a fighter bomber which can:

- **Operate off marginal** air strips close to the front lines.
- **Deliver accurate** rocket fire against heavy tanks when the ceiling is below 5000 ft.

▶ **Operation Mothball**—F-51s are being pulled out of mothballs to fill in the breach. But they are strictly a "weapon of opportunity." The lack of major air opposition, especially jet-propelled fighters, gives the F-51 a chance for one last battle during the transition from obsolete to futuristic air warfare. The F-51s are being flown from air strips which are within a hundred miles or so of the front, but which can't take the F-80s which need a longer strip.

During the first days of the war, bad weather hampered air operations. Seldom was the ceiling greater than 5000 ft. This did not interfere with strafing by the F-80s of troops and trucks. But it did upset the rocket attacks on tanks. Pilots had to make low-level rocket runs. Many rockets fell short. Others hit at such a low angle that they ricocheted off the tank instead of blasting into it.

When the weather lifted, pilots began making their rocket runs from altitudes above 5000 ft. at a dive angle of about 60 deg. As long as the rockets fire properly—many of the 5-in. rockets are from old World War II stocks—pilots say they just can't miss. At the 60-deg. dive angle, rockets seldom ricochet even off the heaviest tanks.

With training and armor piercing rockets instead of the high explosive rockets, F-80 pilots might be able to carry out effective low level attacks on heavy tanks. Veteran fighter pilots think they could improve their score, but they admit that the dive attack gives the best accuracy.

▶ **F-80C Used**—The Fifth Air Force is using the F-80C with the Allison J-33 centrifugal-type engine. Planes are using straight JP-1 fuel, having eliminated starting and purging with 100-octane. Target areas have been between 300 and 400 miles of this base.

First problem that had to be solved was getting the F-80s to the target area and back with enough time allowance on the deck for effective combat operation. With conventional tiptanks this was well nigh impossible. Preliminary experimentation had been undertaken several months ago by the 9th Squadron of the 49th Fighter-Bomber Group with an enlarged tiptank. Use of it had been forbidden by the Air Force, but when war broke, permission was given to try it out.

The new tiptank is made by taking center sections from two Fletcher tanks and inserting these into a third Fletcher tank. Each holds 260 gal. of fuel, 95 gal. more than the smaller tanks. With this additional 190 gal. the F-80s have been going to targets 400 miles away, spending 20 to 25 operational minutes on the deck.

When empty, the tanks do not change the flying characteristics of the plane, according to the pilots. The surface cross-section is the same as that of the smaller tank; the sole difference is an increase in length brought about by the insertion of additional mid-sections.

▶ **Shackles Broken**—Only apparent weakness in the use of the large tiptanks are the shackles. These have not stood up well. Several have broken during pullouts, usually when the tank contained some fuel. Real worry is on takeoff. Should a tank break off then, only a miracle would prevent the airplane from rolling into the ground. Normally this wouldn't happen. But the strip is rough and aircraft bounces in takeoffs.

Jessup Covers the Korean War

A. W. (Bill) Jessup, McGraw-Hill World News correspondent who wrote the accompanying first-hand report of U. S. air operations in Korea, has been McGraw-Hill World News correspondent in the Far East for four years. His assignments have carried him from his base at Tokyo to China, Burma and now Korea, to which he lately has been "commuting" from Japan.

While writing his AVIATION WEEK story, at an air base he was not allowed to identify, Jessup had some comments of his own. It follows:

"Arrived here this morning after an all-night flight. At least the takeoff time was so arranged that it was impossible to get any sleep before or after the flight.

"You would find it all reminiscent of other days. The only incongruity was the Army sedan which arrived at midnight to transport three of us to Haneda. But from there on it was like old times: casual check-in at operations, sitting around and waiting, a little gathering beside the old C-47 while a bored flight clerk describes how to put on a Mae West and a parachute; mail freight, small handbags and typewriters piled in the aisle leaving little room for anyone's feet; unpressed, already sweat-stained khakis; unceremonious slamming of the door; scrunching down into bucket seats trying to find some sleep; creeping cold at 9000 ft. after the heat of Tokyo and before the heat of where we are. The major new element was the correct midnight blue of the United Nations representative's hat. Incongruous, perhaps, but also significant.

"The war is one hell of a mess. . . . Up to this minute, our infantry has been getting the hell kicked out of it. I believe it is safe to say that had the Air Force not pitched in, North Korean tanks would be sitting on the docks of Pusan this week.

"Fortunately, they have mauled up the tanks. But they haven't stopped them yet. Weather for several days has limited air activity and forced the jets to glide-bomb instead of dive bomb. . . .

"It may be better now. The weather cleared today, the F-80s just poured it into the targets. Also, some of our tanks and heavy tank destroyers plus artillery should be in action by now. That should help a lot. But there's no ducking the fact that we've caught hell so far."

The strip, also, has limited the effectiveness of the F-80. Its macadam, which softens in the heat, makes it slow as well as rough. It is so soft that pilots seldom use their brakes when landing. The result is that F-80s can take off with only two 5-in. rockets, except during the first hours of the morning when it is cool. Then they get off with four. Normally, the F-80 should carry eight rockets. With a good concrete strip, there would be no difficulty. An alternate solution is Rato. Pilots say there would be "no sweat" taking off with a full load using Rato. Some pilots actually retracted their landing gear to get airborne during the past week.

▶ **Bruising Performance**—Most startling performance of the F-80 is its ability to take battle punishment. Under wartime operation, pilots have pulled more than 5 to 7 Gs. In battle several have pulled at least 12 Gs getting out of tight spots. There is no indication yet that this has hurt the structural characteristics of the airplane.

Enemy ground fire up to 40 mm. has hit the plane in every part of the engine: flame tubes, plenum chamber, compressor chamber and turbine. About the only places unhit have been the compressor, oil system and fuel system. Wingtips have been sheared by steel cable. One aircraft, attacking a bridge, hit a one-inch cable on the nose. It broke the cable which slashed the skin of the wing. Otherwise there was no damage. Another F-80 was hit by a 40-mm. shell which tore through the tailpipe and sheared about 4 in. off the bulkhead which holds the horizontal stabilizer. It was originally thought that the casting was weak, but the aircraft returned safely to the air base after completing its mission, has been repaired and is back in combat.

Hits in the flame tubes or tail pipe were expected to lead to burning of the surface and secondary fires. This has not been substantiated so far. Only slight scorching has been found around flame tube hits, and not even that around tail pipe holes.

One F-80 took a hit in the turbine knocking out several buckets. The pilot flew back to base and claims he did not know he had been hit. Lockheed's technical representative, Noble G. Hunter, claims that there must have been severe vibrations, but not according to the pilot.

Air Force maintenance experts are convinced that the F-80 could have its oil system shot out and still get back. The engine runs on high speed bearings so they believe it should be able to complete the homeward flight before the bearings burn out.

► **Maintenance Low**—Maintenance has been far less than would have been required by conventional aircraft according to Fifth Air Force maintenance and supply personnel. In fact it is less in combat than F-80 peacetime operations. There have been far fewer engine changes, fewer broken buckets and fewer filter changes.

Use of straight JP-1 fuel is credited for part of this. When 100-octane was used for starting and stopping, lead oxide formed on the buckets, making them brittle. This no longer happens. JP-1 apparently has a lubricating action in the boost pump eliminating common troubles there.

The performance of the Allison centrifugal turbojet engine—especially its ability to take battle damage—has raised a question among some Army and civilian technicians regarding the axial-flow engines. They believe that it could not take the battle damage which the centrifugal type has taken and keep going.

► **Points Raised**—Detailed performance statistics have not been compiled on the F-80, but these other points have been raised by pilots and maintenance men regarding its operation and handling:

- **The alcohol-water injection** system should be eliminated. No one uses it because the added thrust is not enough to make any difference. The tanks could be removed, making it easier for the maintenance men to work on the engine. Or, they could be replaced by tanks to carry JP-1 fuel. The additional 50 gal. would add a valuable five minutes flying time.
- **The electric canopy** is nice but perhaps not worth the convenience. The hand-cranked, slide canopy is just as good. Fewer canopies were jettisoned on the ground when it was used. The electric canopy is a bad headache to maintenance men. All the electric equipment sits right on top of the float valve.

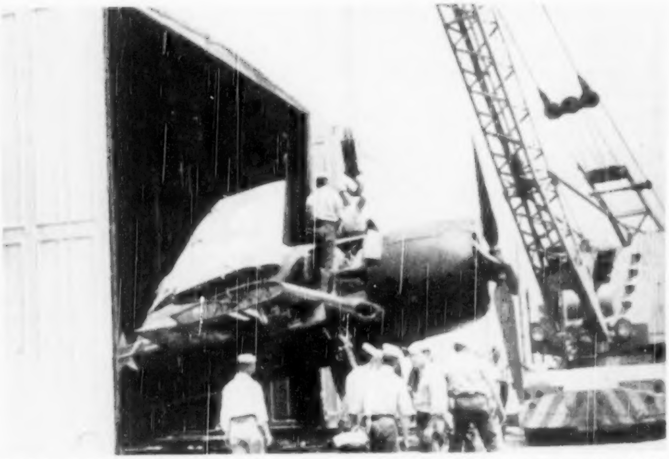
It takes an extra day to remove it to work on the float valve. During bad weather, many float valves stick. Elimination of the electric canopy would save time in keeping aircraft flying without altering the safety factor.

- **A disconnect is needed** in the tip tank air and fuel lines at the midpoint of the wing. These lines run along the leading edge and are continuous. With battle damage in the wing sections, the entire leading edge has to be removed. If the lines could be disconnected in the middle, it would be necessary to remove only the section which has been damaged, either inboard or outboard. Time saving is calculated as one whole day by such a modification.
- **The F-80 isn't too fast** for close ground support. Early battle reports insisted that the F-80 was too speedy. Pilots deny this. They want all the speed they can get. At first they had to learn how to use the speed. Having done this, they are confident they can sneak down slower and more maneuverable conventional aircraft. One advantage of speed in ground support is its ability to get the aircraft away from enemy antiaircraft fire.

Although the F-80 has been maintained more easily than conventional aircraft, it appears that combat maintenance could be further simplified. Before combat aircraft go into production, they should be worked over by line maintenance sergeants under simulated combat conditions.

The accessory compartment of the F-80C, for example, is difficult to work in. Line maintenance men say, "We darn near have to pull the engine to do any work in it." The F-80A, on the other hand, was simple. Every accessory except the governor could be pulled without touching anything else. Their advice might have brought about a better-arranged accessory compartment before the F-80C went into production. Combat aircraft tied to the ground for maintenance are only slightly more valuable than no aircraft at all.

But the F-80 has done well. Squadrons of the Fifth Air Force flew 1,074 sorties in ten days with less than 100 airplanes.



NAVY BEARCAT emerges from steel box at Norfolk base where it was stored in 1948.

More Plane Unwrapping Ordered

Air Force reconditioning contracts near $50 million for two months; Navy providing its own facilities.

By Ben S. Lee

A major effort to unwrap about 5,000 mothballed aircraft is under way by Air Force and Navy. The program is designed to meet equipment needs resulting from the Korean crisis and Government aircraft commitments to North Atlantic Treaty member nations.

In the sixty-day period ending June 30, Air Force ordered almost 2800 planes out of storage and awarded contracts approximating $50 million for their reconditioning. Navy is now refurbishing a similar number of combat types. Cost of their reconditioning, however, is not available due to Navy practice of providing its own maintenance and overhaul facilities.

Air Force contracts awarded during July are not as yet tallied officially, but Aviation Week was informed that July contracts awarded for reconditioning aircraft in storage are approximately double those of June. Navy sources say that schedules of withdrawal of aircraft from storage in July will remain approximately at the same level as they were in June.

► **USAF Contracts**—USAF has disclosed that it has already awarded the following plane reconditioning contracts:

Texas Engineering and Manufacturing Company, [illegible] for [illegible] aircraft; [illegible] for [illegible]; [illegible] for C-47 [illegible]; [illegible] for F-51 Mustangs.

Pacific Airmotive Corp., [illegible] for T-6 aircraft; [illegible] for F-51 Mustangs.

Grand Central Aircraft, $1,036,181 for T-6 trainers; $1,884,160 for F-51 Mustangs; $6,250,000 for B-29s.

Lockheed Aircraft Service, $1,122,321 for F-51D Mustangs.

Curtiss-Wright Corp., $8,000,000 for B-29 Superforts.

North American Aviation, $8,571,482 for T-6G trainers.

Boeing Aircraft, $447,228 for YC-97 Stratofreighters.

Slick Airways, $1,810,000 for C-46 Commandos.

Douglas Aircraft, $7,500,000 for B-26 bombers.

The services tried various methods of storage. Navy settled on three: Extended storage indoors; outdoor storage in Arizona, and canning entire aircraft. Air Force adopted a plan of "cocooning" an entire plane in a water-proof and almost completely airtight spray coating.

For the most part, according to USAF sources, cocooning proved expensive and time-consuming from the point of getting aircraft back into operational status. In some instances, it was reported, the cocooning material has proven hard to remove. Secondly, USAF method of cocooning surplus planes in an "as is" condition has proven an expensive economy in light of today's emergency need higher reconditioning costs.

▶ **Out in the Open**—After three years of experimentation with various methods, USAF materiel experts finally came to the conclusion that open-air storage in the dry desert air of Arizona was the most economical and practical method of all. They also learned, as had Navy, that a bare minimum of grease preservatives were needed to protect the aircraft from the elements.

Cost of initial installation of a single-engine aircraft by Navy for outdoor storage at Litchfield Park, Ariz., is approximately $250 and an additional $70 per month per plane to maintain preservation. Navy determined that it cost approximately $400 to remove a single-engine plane from storage and prepare for fly-away delivery to rehabilitation centers. Air Force estimates for similar storage and delivery to reconditioning contractors are approximately the same.

Air Aid Abroad

AF to pay $284 million for planes and parts in foreign arms program.

Before next July the U. S. Air Force will spend $284 million on new aircraft and parts procurement to build air forces of non-Communist nations abroad. This is the allocation under the $1.2 billion foreign arms aid authorization on which Congress agreed last week.

An appropriation to implement the program, now under consideration, is expected to slide through House and Senate without opposition.

▶ **Big Boost**—The $284 million is a big boost over the $92 million allocated for new aviation procurement in the $1.3 billion program for the 1950 fiscal year. An even bigger expenditure is in sight. The 1951 fiscal year program was drawn before the Korean crisis, which has increased the urgency of strengthening the defenses of Europe, Iran, the Philippines, and other points of possible attack.

The President called attention to this in his message to Congress on the Korean war. Deputies of the North Atlantic pact nations are now meeting in London on plans for stepping up the re-arming of Western Europe.

In addition to the new equipment, USAF will furnish foreign countries other planes, parts, and accessories from its excess stock-on-hand, valued at $91 million, and spend $40 million in training foreign nationals. Cost of repairing and rehabilitating the mothballed equipment, earmarked for abroad, is estimated at $7.6 million.

The arms authorization bans the use of U. S. funds for building war plants abroad. But it seeks to encourage European nations to construct new aircraft plants and other defense factories and revitalize existing ones by permitting the U. S. to supply them with all types of production machinery.

This is a breakdown on where U. S. foreign aviation aid, administered by the Air Force, will go (the Navy will also furnish these areas with substantial aviation aid, but a breakdown on the Naval program is not available):

- **Western Europe**: New procurement, $259 million, excess mothball equipment valued at $89 million which will cost $7.5 million for repair and rehabilitation, training, $9 million. This evidences a new emphasis on building up the air defense on the continent. The 1950 fiscal year program was overwhelmingly a ground-force proposition and allocated only $44 million for new planes and parts, mothball equipment valued at $73 million, and $1 million for aviation training.
- **Greece and Turkey**: New procurement, $25 million, training, $450,870. The air strength of these two countries has been built up by U. S. support over several years. Last year, the U. S. supplied them with $45 million in new aircraft and equipment.
- **Iran and the Philippines**: New procurement, $1.4 million, excess mothball equipment valued at $937,005 which will cost $164,015 for repair and rehabilitation, training, $437,171. A supplemental request from the President vastly increasing the outlay to build up the air arms of these two countries, vital strategic outposts, is expected.

Manpower Controls Seen Out for Now

Manpower and wage controls—the major concern of aircraft manufacturers in meeting new production goals to support the Korean war effort—are probably out until after the November elections and politicking after the labor vote eases.

Chairman Stuart Symington of the National Security Resources Board told the Senate Banking and Currency Committee that manpower would become a key problem for defense producers over the next few months as the war program gets under way. This is primarily because of a large-scale drain on the labor market under a civil defense program—a drain that this country did not have to any serious extent in the last war. He said that a national program, blanketing the country with a protective defense force, concentrated in areas of strategic installations and population centers, would be ready for implementation by September 1.

However, the "Defense Production Act of 1950" which the President urged Congress to enact promptly last week explicitly denies executive control over manpower utilization and authority to require labor to perform on defense contracts. It does give the President sweeping powers over the industrial machinery for war production, as follows:

- **Priorities and allocations**: Authority to require firms to accept contracts, or give them priority in performance, and to allocate materials and facilities as "necessary or appropriate to promote the national defense."
- **Requisitioning**: Authority to take over any property in the national defense interest.
- **Contract guarantees**: Authority, through the three defense departments, to guarantee loans made to war contractors and subcontractors in connection with their defense business.
- **Plant expansion**: Authority to make loans to business enterprises "for the expansion of capacity, the development of technological processes or the production of essential materials."
- **Stockpiling**: Authority to purchase, without limitation, strategic materials for defense purposes.
- **New corporation**: Authority to utilize the Reconstruction Finance Corporation, or set up a new corporation, with a $2 billion capitalization to implement the plant expansion and stockpiling programs. The odds are that a new corporation will evolve, primarily because of the actions of RFC directors that have been unearthed recently by the Banking and Currency subcommittee headed by Sen. William Fulbright. At the request

of Sen. Paul Douglas, who declared his reluctance to agree to legislation granting the present RFC board $2 billion in additional lending authority, a conference of members of the National Security Resources Board and the Banking and Currency Committee on a new government financing arrangement has been scheduled.

Canadian Aircraft Industry Ready

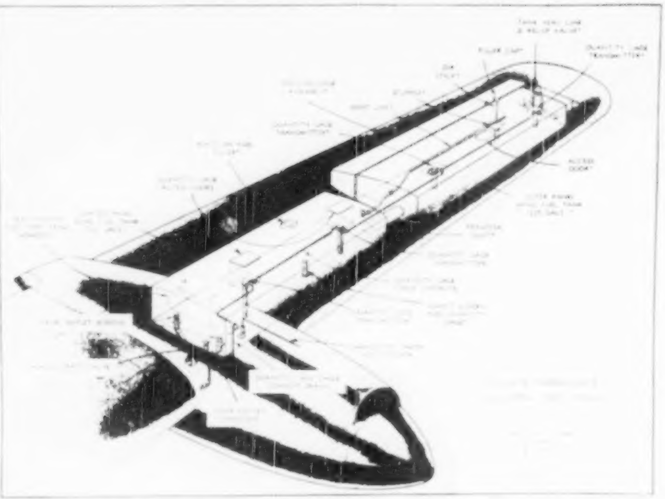
Canada's aircraft industry, is equipped for rapid conversion to heavy production. A survey covering four principal manufacturers shows.

Three firms have contracts totaling 147 machines. Of these, 100 are short-range jet fighters and 47 are elementary trainers. Only other military orders reported are for modification, or overhaul of craft already in service.

Pending official notification to accelerate production, Canadian plane builders began gauging plant capacity with a view to boosting output. Doubling the present rate, they agreed, would be a comparatively simple matter.

The survey shows this picture:

- **Avro Canada Ltd., Malton.** An initial RCAF order for ten Canadian-designed CF-100 fighters is in advanced assembly stages. Two planes are already being flight-tested. Equipment is being installed to mass-produce the powerful Orenda jet engine. Avro employs 5500.
- **Canadair Ltd., Montreal.** Within ten days the first Canadian-made F-86 Sabre interceptor will be in the air. A Defense Department contract calls for delivery of 100 Sabres over the next two years.
- **De Havilland Aircraft, Downsview.** Delivery will soon begin on 47 Chipmunk elementary trainers which the RCAF will transfer on long-term loan to civilian flying schools. De Havilland employs 500.
- **Canadian Car and Foundry Co., Montreal.** No new military aircraft are being built. Canadian Car is reconditioning Harvard trainers drawn by the RCAF from storage depots.



INTEGRAL TANK installation shows how Turboliner fuel capacity is boosted 50 percent.

Convair-Liner Ups Fuel Capacity

Range increase for the Convair-Liner has been made possible with the fabrication of new outer wing panels containing integral fuel tanks.

Each redesigned outer panel contains a 225-gal. tank, which brings the total fuel capacity of the airplane to 1500 gal. This is nearly a 50 percent improvement over the present 1050-gal. supply.

▶ **Indonesian Use**—The first eight sets of panels being fabricated with the tanks will go to Garuda Indonesian Airways. A ninth set is being made for Allison's Turboliner, a modified 240 being equipped with T-38 turboprop engines.

Convair will offer integral tank outer panels as replacements for original, non-fuel-carrying panels. Airlines will make the new installation in their own shops.

▶ **Installation Details**—Outer panel tanks are direct-connected to the center section tanks by a duct located at the splice access hole between center and outer wing panels.

Both outboard and inboard tanks are fueled from a single filler neck located on the outboard tank. Standard complement of plumbing is included with the outer panel tank, along with two quantity gage transmitters.

Weight penalty paid for structural modifications is only 339 lb., of which part is attributable to reinforcement of the wing center section. Total weight increase of the airplane should then be 3039 lb., including the extra 450 gal. of gasoline.

P&W "Story" Tells Of Long Planning

The U. S. aircraft industry again has been called upon to expand production after the fighting has started. This time, with more manpower, more tools, more space and more know-how, it is in a better position to swell than it was in 1941. But the product it will deliver in increasing volume will still be the fruits of development of four and five years ago—nurtured with difficulty in the arid climate of a peacetime economy.

How individual companies have managed on lean military contracts to prepare for war while still at peace generally has been a secret of the board rooms. But now, however, one of the key firms of the aircraft industry puts it on the record and furnishes not only the aircraft industry but government and the public with a case history of long-range planning.

▶ **P&W Story**—"The Pratt & Whitney Aircraft Story" was issued by United Aircraft's engine division in connection with the celebration on July 26 of its 25th anniversary. In view of the Korean action and the consequent increase in the military budget, the timing couldn't have been better.

Frederick B. Rentschler founded P&W in 1925 on the concept that the "engine is the heart of the airplane." Military power plants established the company's reputation and commercial business followed in the wake. But what happens when peacetime budgets destroy military business and a competitor takes your commercial business? That happened to P&W in the mid-1930s. Importance of the outcome can be summed up briefly: During World War II, P&W engines produced 50 percent of all the horsepower required by the combined American Air Forces.

P&W's timing was not new. But it is a lesson, says the authors of the book (P&W's public relations director Paul Fisher and P&W public relations manager Robert B. Hotz), that "apparently must be learned first-hand."

While P&W had gone along tinkering with about half a dozen engines to improve them and develop a bit more power, Wright Aeronautical had concentrated on new engines developing a great deal more power than existing models. It had stepped far into the future. And the business went to Wright.

▶ **Quick Learner**—Because P&W learned its lesson, it had the famed R-2000 and 2800 ready for volume production for World War II, and the R-4360 for postwar use. Each engine was far more powerful than its predecessors.

Last week P&W dedicated its earlier course, this time in the jet field. It took on the licensing rights to Rolls-Royce Nene because here was an opportunity to produce an engine that would jump far ahead in power delivered over other U. S. engines.

In 1945, P&W management calculated that to stay in business it must have in five years the most powerful U. S. turbojet ready for production, and a full program in this new field of power.

Last week P&W dedicated its Andrew V. Willgoos Turbine Laboratory, had a large turboprop ready for flight test, and the country's most powerful turbojet (the J-48) in volume production for aircraft that will be the backbone of combat forces that may be needed later this year.

Super DC-3 Look For 100 Navy R4Ds

Douglas Aircraft's Super DC-3 program, which got off to a slow start, received a big boost when the Navy announced last week it is having 100 R4Ds (DC-3s) modernized into the newer type. At least two other major companies are sharing in the pie—Wright Aeronautical, which will supply the R-1820-C9HE engines to power the Super R4Ds, and Hamilton Standard which will furnish high activity props.

▶ **Significance**—The new contract, estimated to run about $20 million, bears a twofold significance:

- It is the first major recognition by the services since World War II of a civilian transport for military cargo use. It may thus presage military purchases of the DC-6 cargo versions and Convairs, and modification of more Super DC-3s for the Air Force.

The Navy picked the Super DC-3 and designated it R4D-8) after carefully looking over the Martin 2-0-2 and Convair 240. Presumably the Douglas' price—about $300,000—was a big factor, as probably was the promise of earlier deliveries. A further factor also was the performance the R4D-C-47 types have established in their long service.

- **Of significance also** is the fact that the Navy's order keeps the Super DC-3 project alive for commercial lines and that civilian buyers will undoubtedly benefit from the writeoff of costs on the Navy deal.

The order was said to have been placed weeks prior to outbreak of Korean hostilities. The design changes will enhance basic R4D performance considerably. Double the range, up useful load by 30 percent and increase speed by 50 mph.

The modernization will include the more powerful engines, new outer wing panels, fuselage lengthened by more than three feet, larger empennage, fully enclosed landing gear wells, retractable tail wheel, high-pressure hydraulic system, and wing panel tanks to double fuel capacity.

U. S. Manufacturers Visit British Plants

Beautiful workmanship and design in new British aircraft displayed to U. S. aircraft manufacturers during their recent Farnborough visit and tour of British plants were cited last week by Adm. DeWitt C. Ramsey, president of the U. S. Aircraft Industries Assn.

"The British come to school to us for mass production techniques, but they make fine airplanes, and we can learn much from them," Ramsey said.

Visits by the American group were to the Handley-Page plants at Radlett and Reading, de Havilland's Hatfield and Edgeware plants, Vickers at Weybridge and Bristol at Bristol. The AIA chief was especially impressed by the de Havilland establishments, which he considered most comparable to U. S. plants, and by that company's new jet transport, the Comet.

▶ **RAF Shows**—At the RAF show at Farnborough, performance of the new sweptwing British experimental jets and the expert piloting of the British flyers were most spectacular.

A large group of American aviation industry leaders and representatives is expected to make a return trip to England in September for the annual Society of British Aircraft Constructors show at Farnborough, when the emphasis will be more equally divided between civil and military aircraft, Ramsey said.

Seven U. S. aviation company presidents accompanied Adm. Ramsey and four Air Materiel Command officials on the recent tour.

The party included LaMotte T. Cohu, president, Consolidated Vultee Aircraft Corp.; Richard Boutelle, president, Fairchild Engine and Airplane Corp.; J. S. McDonnell, head of McDonnell Aircraft Corp.; Fred C. Crawford, president, Thompson Products Inc.; H. M. Horner, president, United Aircraft Corp.; Roy T. Hurley, president, Curtiss-Wright Corp., and Lee Atwood, president, North American Aviation, Inc.

The Wright Field officers included Lt. Gen. Ben Chidlaw, AMC commanding general, Maj. Gens. Sam Brentnall, director of research and development, and C. B. Stone, director of maintenance and supply, and Brig. Gen. A. H. Johnson, chief of industrial planning.

Although American press representatives were not invited to make the trip on the ground that the show was classified, the British Air Ministry invited the Soviet ambassador and air attache to see the flight and static show.

New Turbine Prop

First propeller in the new Turbo-Hydromatic class, designed for gas turbine engines, recently was test-flown successfully on a light bomber.

Two of the new props, which were developed by Hamilton Standard division of United Aircraft Corp. under Navy sponsorship—a dual rotation, eight-blader for the Navy and a larger four-blader for the Air Force—have been delivered to the services for proving.

The Turbo-Hydromatic embodies some refinements of its forerunner—the Super-Hydromatic—including the self-contained hydraulic system and individual pitch-changing motors at the blade bases.

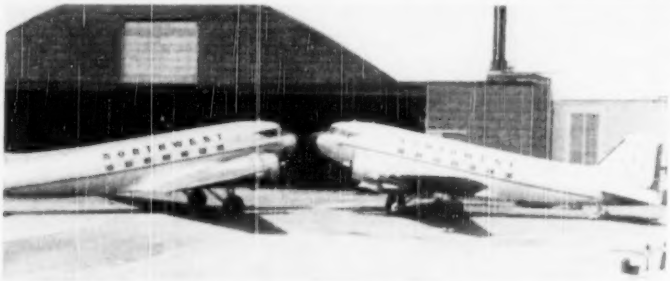
The unit's new electronic control is designed to be fail-safe and coupled with a high rate of pitch change affords accurate and fast response.

Douglas Planning Jet Pods for DC-6

Douglas Aircraft Co. has drawn up plans for jet pod versions of its DC-6A and DC-6B to show airline operators and military officials interested in boosting the speed of the reciprocating engine transports.

With a Westinghouse J-34 auxiliary turbojet engine under each wing, the DC-6s cruising speed could be increased from the present 300 mph. to at least 400 mph., according to Douglas officials. Wing tip fuel tanks would also be installed, and the ship's gross weight would be boosted substantially.

The Westinghouse J-34 turbojet engine is rated up to 3400 thrust pounds. Last April, Boeing Airplane Co. announced plans for addition of two auxiliary jet pods (probably the J-34) to its Stratocruisers. But there has been a lack of customer interest in the idea and the Boeing project is dormant.



GLEAMING NWA DC-3 at right has received "Air Wash" treatment. One at left has not.

'Air Wash': Dual Purpose Cleaner

Cee-Bee's time-saving product is reported to be equally effective for removing oxidation and traffic film.

A new type of airplane cleaning agent—Air Wash—is bidding for recognition among airline operators and manufacturers as a simultaneous remover of oxide and traffic film. These films have heretofore called for two different types of cleaners, according to the maker, Cee-Bee Chemical Co., Los Angeles and St. Louis.

But that isn't all. The manufacturers recommend their new product as eliminating the need for other oxidation cleansers, if it is used at regular 200-hr. intervals. This is true even if the aircraft flies in industrial areas, provided it is oxidation-free at the start.

The manufacturer says that time required to clean a transport plane with Air Wash is 12 manhours for a DC-3, 25 for a DC-4 and 35 for a DC-6 or Constellation.

▶ **No More Polishing**—One large airline overhaul and maintenance base has recently completed extensive laboratory and service tests on Air Wash. As a result, it expects to eliminate the polishing operation on its airliners, Cee-Bee reports.

The airline's laboratory tests have shown that an application of Air Wash on 24ST panels left no sign of attack on metal or zinc chromate primer after a seven-day oven humidity test.

As a result of these tests, the airline was scheduled to start using Air Wash on a regular basis. Each plane was to be Air Washed every 500 hours, starting in an oxide-free condition, with washings oftener as operational schedules permit. Cee-Bee considers the 500-hr. interval adequate for aircraft operating in non-industrial or overseas areas.

▶ **Factory Use**—A major West Coast manufacturer is using Air Wash as a final cleaner on its new military transports as they come out of the jigs to remove crayon marks, grease, shop stains and other manufacturing soil.

Cee-Bee engineers think their new cleaning agent will displace some of the company's older cleansers which do not possess the dual-purpose qualification.

For example, the oxidation remover produced by the manufacturer, and designated Cee-Bee A-7, is used twice a year by a number of commercial operators and the military. It takes more time to apply than the new chemical (approximately 30 manhours for DC-6 or Connie) and must be used in conjunction with an alkaline-type cleanser such as Cee-Bee Alumalov A, used in solvent or water emulsion, or with a Cee-Bee cleaner.

▶ **Keeping Them Clean**—The company pointed out two important reasons for the constant battle with the dull, grey, dirt on aircraft:

- **Appearance.** Clean airplanes look efficient.
- **Corrosion.** Dirt deposits are almost always the origin of corrosion.

Whatever the reason, countless thousands of dollars and manhours have been spent to keep aluminum aircraft clean, bright and corrosion-free.

According to Cee-Bee, there are three types of deposits: surface oxidation, traffic film and oil, grease and other soluble, loose deposits. Cee-Bee says present maintenance methods do not always take into consideration the types of deposits and their make-up. It claims that the result is excessively high cleaning costs which often means that less and less cleaning is performed.

▶ **Oxide and Corrosion**—Cee-Bee contends that aluminum aircraft cleaning should begin with the removal of oxide. Too frequently this is not done. Complete removal of aluminum oxide is necessary before any regular maintenance procedures can be initiated.

Methods for removing oxidation:

- **Hand polishing** with an abrasive material. This is thorough and gives a beautiful luster, but Cee-Bee says the cost is high and the results are not enduring.
- **Chemical brightening.** Cee-Bee states that this method is equally thorough, leaves a natural aluminum color and is effective considerably longer.

Oxidation, which is constantly forming, leads to surface corrosion. The black marks of corrosion can be removed, but the resultant pitting remains for the life of the equipment.

▶ **Traffic Film**—Probably one of the biggest headaches of aircraft maintenance personnel is the removal of traffic film, composed of soot, manufacturing fumes and general air pollution.

Formation of these deposits is hastened by the high speeds and pressures to which modern aircraft surfaces are subjected.

Cee-Bee says that traffic film will form on aircraft in as little as 100 hours, and effectively resists a "quickie" wash.

▶ **Washing and Degreasing**—Dust, dirt, oil and other loose surface soils can be easily removed with emulsion cleaners by the spray-on, hose-off method. Regular cleaning is important since oxide and corrosion can form under these surface deposits.

During the early days of chemical cleaning, these cleaning phases were handled separately and were not correlated to the over-all maintenance schedule, the company avers. By working in cooperation with maintenance companies, fixed-base operators and airlines, Cee-Bee fitted each step of a cleaning program into regular scheduled overhaul periods, thus reducing manhours and lay-up time of the aircraft.

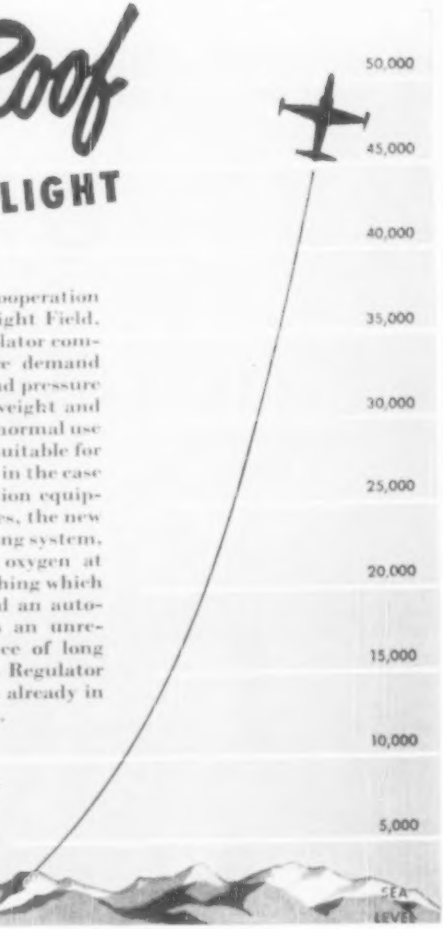
TWA and Chicago & Southern provided test airplanes—operating on regular schedules for a stipulated period—to assess this "engineered cleaning procedure."

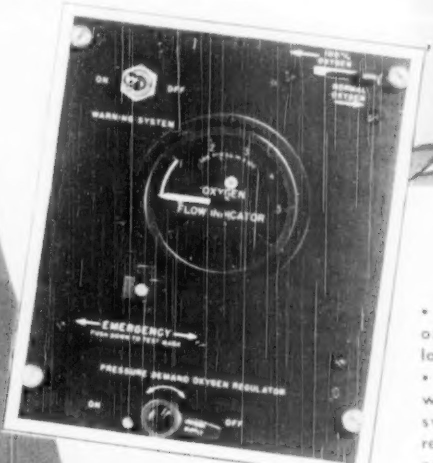
Where originally three different cleaners were required to cope with the three phases of cleaning an aircraft, Cee-Bee says, constant development has resulted in one cleaner which will do the complete job in most cases, if used on a frequent enough and regular basis.

Raising the Roof

ON HIGH ALTITUDE FLIGHT

Developed by Eclipse-Pioneer in cooperation with the Aero Medical Lab at Wright Field, the new AF Type D-1 Oxygen Regulator combines the functions of a pressure demand oxygen regulator, flow indicator and pressure gauge—all in one compact, lightweight and easily mounted unit. Designed for normal use up to 43,000 feet, this regulator is suitable for emergency use up to 50,000 feet (as in the case of failure of the cabin pressurization equipment). Among its many advantages, the new regulator includes a built-in warning system, automatic regulation of air-oxygen mix to 100% oxygen at approximately 33,000 feet, automatic pressure breathing which becomes effective at approximately 40,000 feet, and an automatic "Comfo" breathing feature which assures an unretarded oxygen flow at all times, despite resistance of long supply lines. Thus the new AF Type D-1 Oxygen Regulator joins the long list of Eclipse-Pioneer developments already in service helping to keep American air power on top.





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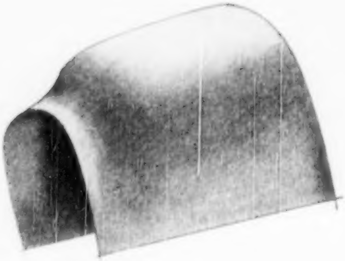
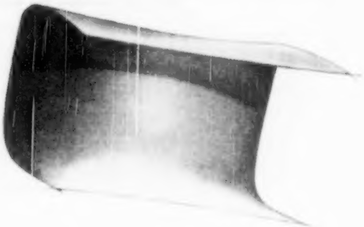


INTER HULL NACELLE SKIN



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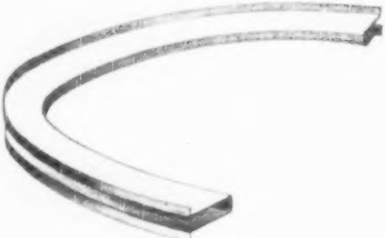
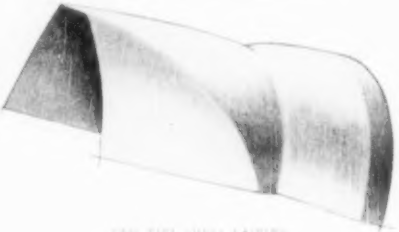
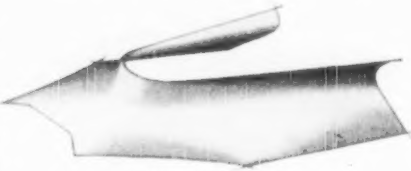


FUSELAGE FRAME



TAIL PIPE SHELL FAIRING



[illegible] CANOPY FILLET

NEW AVIATION PRODUCTS

Electronic Timer

An electronic timer providing automatic control of operation, limit, and sequence timing for "literally thousands of industrial processes," has been developed by the General Electric Co., Schenectady.

A few of the many uses of the new device are:

- Operation timing to control duration of such processes as heat-treating;
- Limit timing to stop conveyor belts if material piles up;
- Sequence timing with two or more of these units combined to control duration of operation on bearing-grinding machines, centrifuges and other equipment.

GE engineers say the new timer was designed to "fulfill industrial requirements for flexibility of application, accuracy and reliability in operation, low maintenance and simplicity in servicing." It is available in three time ranges: .06 to 1.2 seconds, .6 to 12 sec.; and 6 to 120 sec.

The device has a detachable back-plate which mounts directly on a rigid conduit or any flat surface. After wires are brought to the back plate and pulled through, the timer is mounted on the plate by means of four screws. Wiring to the terminal boards and installation of the cover completes the set-up.

Space between the terminal board and the cover gives adequate room for all front-connected wiring, including wiring for accessories, the company explains. A dual set of contacts on the unit permit control of two operations on the same time schedule.

Life tests indicate the device can perform a million or more operations at these controlled load requirements: inrush 15 amps., carry 10 amps., and break 5 amps.

An important feature of the timer is that the only moving part is a single relay armature. This cuts wear to a minimum. The electronic tube used in the unit is a GE 615--a standard type

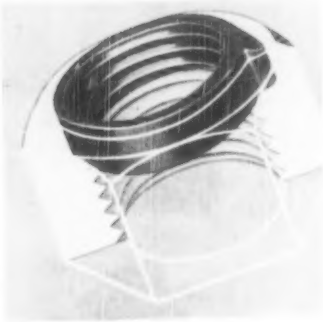
Linear Actuator

A recent arrival on the aircraft equipment counter is a small linear actuator measured for installation in control surfaces or other limited areas. The device is capable of handling tension or compression loads up to 175 lb.

It can be used for positioning valves, oil cooler shutters, small trim tabs and similar components. The device is being produced by the Barber-Colman Co., Rockford, Ill., and designed to meet all applicable AN requirements, the firm says.

This actuator has a stroke which is adjustable up to 3 in. Loads are taken by a hardened ground screw and nut with ball thrust bearings, while speed reduction is accomplished through machine cut gears. The unit is so designed that after it is installed, limit switches are easily accessible for adjustment.

The maker will equip the servo end of this unit with a bronze bushing eye or with self-aligning and shock-absorbing, bonded-rubber connectors, as desired. Barber-Colman actuators are available for two-position or proportioning control.



Self-Locking Nut

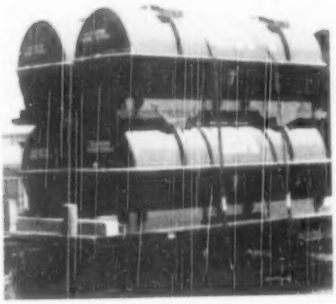
A self-locking nut which reportedly can be applied in either direction, can be used many times over and will withstand temperatures of 750 F. without losing its locking power has been developed by Security Locknut Corp., 1815 N. Long Ave., Chicago 39.

The firm believes these characteristics make the nut particularly suitable for use with jet engines. It says tests show the nut will stay exactly where it has been positioned on a bolt, even when vibration is so violent as to destroy bolt.

The part consists of a standard steel nut and a slightly elliptical retainer ring. When the locknut is used, the bolt forces the heat-treated steel retainer into circular shape, causing it to grip the threads under high pressure. Even repeated applications will not distort threads of the bolt, the company claims. Bolt load or stress is borne entirely by the nut and not by the locking device.

The retainer is isolated from bearing contact with the nut, functioning solely as a lock. It is prevented from rotating within the nut by lugs which fit into cavities machined in the nut body.

The parts are made with National Coarse and National Fine threads in standard sizes from ¼ to 2½ in.



'Canned' Engines

A new line of metal containers for shipping and storing aircraft engines has been placed on the market. The "cans" shown above are designed for carrying J47 jet engines and are mounted horizontally. Up to 16 of this type (Model 55) can be shipped in two tiers on a single railroad flatcar.

The new containers were engineered by A. E. Bausenbach, Inc., 19 Allen St., Buffalo 2, N. Y., and are produced jointly by that firm and Alco Products division of the American Locomotive Co., Dunkirk, N. Y.

Bausenbach formerly made support assemblies for wooden crates, and says Allison division of General Motors Corp., and General Electric Co. have used its shipping supports for transporting all their jet engines.

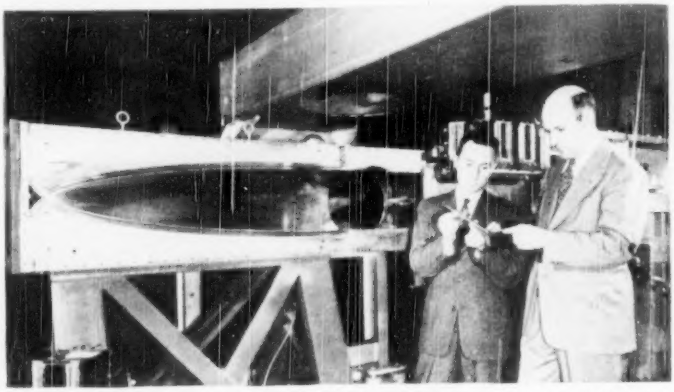
Its new line of metal containers is designed "to completely protect aircraft gas turbine and reciprocating engines against the most extreme conditions encountered in handling, shipping and storing in all parts of the world."

Containers for jet engines all are designed for horizontal mounting, while those for radial reciprocating engines are vertically mounted. The firm reports that about 500 containers for shipping J33, J35 and J47 jet engines were shipped in May. It says prices for these containers compare favorably with the wooden crate assemblies they formerly used.

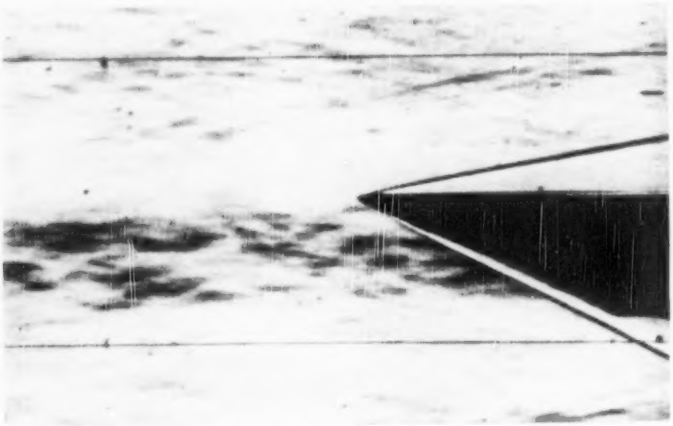
AERONAUTICAL ENGINEERING

Hypersonic and Unsteady Flow Studies

NACA reports on two years of aerodynamic tests and calculations.



JOHN V. BECKER, chief of compressibility research division, and Charles H. McLellan, section head in charge of 11-in. hypersonic tunnel, sparkplug NACA hypersonic research.



SCHLIEREN PHOTO of Mach 6.9 airflow over carefully-aligned plate shows how boundary layer growth in hypersonic flight makes a flat plate into an aerodynamic wedge.

Hypersonics—newest aerodynamic fad—has been one subject of increased research concentration at the National Advisory Committee for Aeronautics.

Early results of basic NACA work have been compiled by John V. Becker, chief of compressibility research division at the Langley laboratories. Lumped in with the hypersonics were the end results of some interesting experiments in the unsteady flow regime.

Becker's paper, "Results of Recent Hypersonic and Unsteady Flow Research at the Langley Aeronautical Laboratory," summarizes two years of experimentation.

▶ **Hypersonic Tunnel**—Chief NACA tool for basic hypersonic research is a blowdown type of windtunnel, capable of test section velocities between Mach 5 and 10 (Aviation Week, Mar. 6, 1950).

Envisioned in 1945, and developed from a pilot model begun that same year, the tunnel first operated in November 1947.

Normally, a blowdown tunnel operates only for a brief testing cycle, but NACA resorted to three devices to increase the running time:

- A heater upstream of the test section.
- A cooler downstream of the test section.
- An adjustable second throat.

Current duration of test run varies from 60 to 90 sec., depending on the model support configuration.

▶ **Shock Tube**—As an aid to unsteady flow research, NACA uses the "shock tube," which is a kind of poor man's wind tunnel. All it comprises is a tube with two chambers separated by a diaphragm. Gas at two different pressures fills the chambers. By bursting the diaphragm, a shock proceeds to the low pressure end of the tube at a low supersonic speed, and a rarefaction wave heads the other way at sonic speed.

These tubes have been used to study reflection phenomena of shock waves, and as intermittent wind tunnels for the investigation of transonic and supersonic flow patterns.

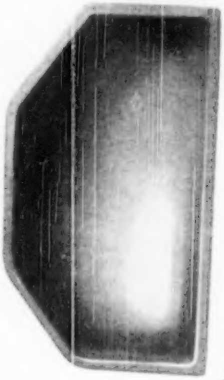
▶ **Flow Visualization**—Having produced supersonic flow by any of the usual means, it is convenient to be able to "see" it with some optical technique, such as the schlieren method. NACA experience has shown that the usefulness of ordinary schlieren technique reaches a limit at the low pressures associated generally with high Mach numbers in the test section. Example quoted: pressure of about 1mm. of mercury with a slender model at Mach 7. By passing the light beam through the test section twice, the limit for schlieren can be extended to about Mach 10 for a 50-atmosphere stagnation pressure. For higher speeds, and for low density aerodynamic research at all speeds, schlieren is quite useless.

So NACA turned to the nitrogen afterglow technique suggested to them by Dr. Joseph Kaplan (Aviation Week, June 20, 1949).

Earlier studies, made independently of NACA, showed that the afterglow decay released a large amount of heat, a phenomenon which could be expected to produce some aerodynamic effects in a supersonic nozzle. Recent NACA investigation has found that for their applications, where the glow has a life of only about one second, the temperature rise through the nozzle is only a small fraction of a degree.

Aerodynamic effects of the afterglow technique then can safely be assumed to be negligible.

ROHR



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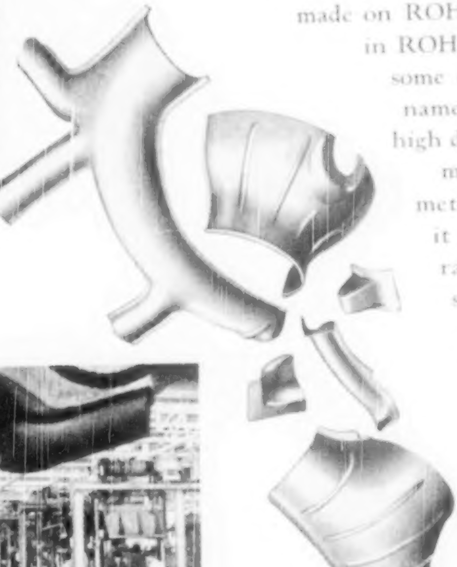
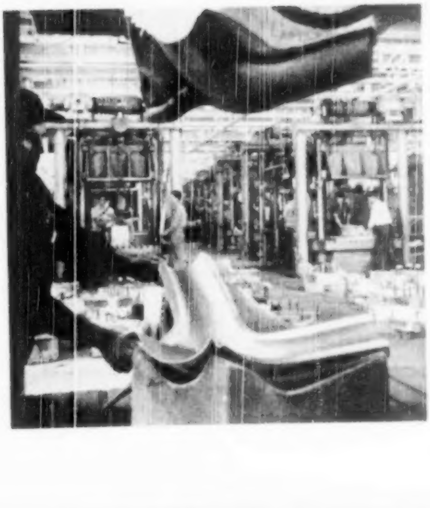


These are typical drop hammer stampings -- made on ROHR-designed drop hammers in ROHR'S drop hammer shop for some of Aviation's most famous names. ROHR has developed a high degree of skill in drop hammer work . . . and uses this method of production because it lends itself so well to the rapid and ever-changing design demands of the Aircraft Industry. When you need something made of metal -- ask ROHR engineers how it can be made for you better! faster! cheaper!



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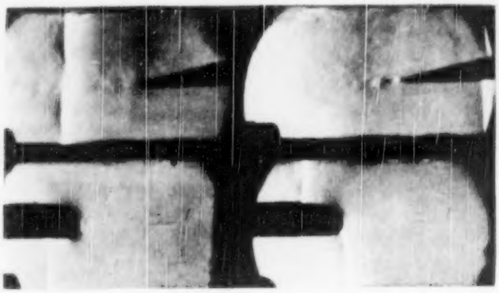
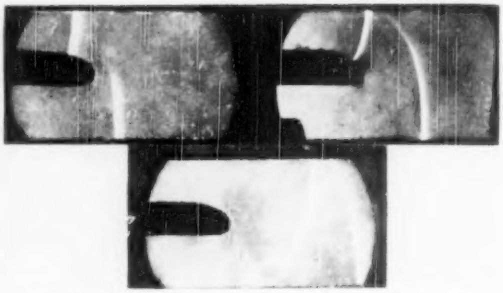


WEAK SHOCK travels to right against subsonic flow. Sequence schlieren photos show asymmetrical body dividing shock into . . .



TIME SEPARATED halves, producing final configuration of two weaker shocks which fill cross-section of flow channel.

Currently, nitrogen afterglow is not utilized to give a qualitative analysis of shock strength, such as is possible with schlieren. This is because the brightness of the afterglow depends on a number of other factors besides fluid density. But some day, Bexley believes, it will be possible to use afterglow technique to give an indication of shock strength.

▶ **Boundary Layer Effects**—Subsonic and supersonic effects of boundary-layer presence on pressure distribution are considered as confined to the trailing portion of the aerodynamic surface. Over the leading portion, the boundary layer for the usual range of Reynolds numbers is too thin to produce any measurable influence.

But hypersonic effects are another story. Recent calculations and tests in the 11-in. hypersonic tunnel at Mach 7 have shown that boundary layer thickness increases so greatly that the pressure distribution over the forward portion of the surface is strongly altered.

For a flat plate, the displacement thickness of the boundary layer for Mach 7 is almost ten times that for Mach 1. This increase is also associated with a large temperature rise in the case of high Mach numbers and the corresponding viscosity increase.

The growth of the boundary layer along all of the plate produces the equivalent of a wedge, aerodynamically. For example, at [illegible] of the plate surface, the slope of the effective surface [illegible] equivalent to [illegible].

▶ **Significance**—There are two important effects of this phenomenon predicted by boundary layer [illegible]:

- Drag of supersonic wings will be increased owing to the large increase in skin friction.
- Leading edge heating of supersonic aircraft will be [illegible] tremendously.

▶ **Shock Clock**—[illegible] the shock tube has been primarily concerned with the development of adequate pressure measurement equipment. Having developed the instrumentation, the next [illegible]

A commercially available pressure-measuring crystal was used in the shock tube for a series of tests planned to obtain time-pressure histories of the disturbances in the tube. Conclusion reached: the only significant variation from one-dimensional flow theory came from the finite time and distortions associated with diaphragm rupture.

▶ **Diffusion Confusion**—A supersonic diffuser can be the mother lode of a host of unsteady flow phenomena. Probably the best known of these is the problem of the oscillating shock.

Oscillations in flow may be due to pressure disturbances from the subsonic portion of the diffuser, to combustion fluctuations in the case of a ramjet, or to boundary layer interaction with the normal shock, also found in ramjet practice.

Take the latter case, for example. A supersonic ramjet utilizes an inlet which acts as a diffuser. For high diffuser efficiency, the normal shock has to be positioned inside the cowled inlet, a configuration which signifies that all the oncoming air is swallowed by the ramjet.

If throttling of the flow through the ramjet occurs—and it might, as a result of excessive combustion produced by a rich mixture—the normal shock can be forced forward of its intended position. This spills some of the oncoming air around the outside of the cowl.

▶ **Ramjet Tests**—NACA investigated the phenomenon in conjunction with some of its ramjet research where the inlet is similar to that of the so-called single cone type. The inlet consists of a center body with a conical leading surface fairing into a streamlined afterbody. A cowling surrounds the conical body.

There were pronounced pulsations. A study showed that the size of the inlet was [illegible]. These came in pulsations as the separation of flow on the conical surface resulting from the failure of the boundary layer to pass through the strong external shock. When separation and spilling did occur, the reduction in flow through the inlet produced a drop in back pressure which was equivalent to reducing the throttling, and the shock was drawn into the inlet again. The process repeated itself, alternately swallowing and disgorging the shock.

▶ **Secondary Influences**—These tests also pointed up the effects of configuration of the test duct and throttle, in that they had a controlling influence on the character and frequency of the pulsations.

It should be emphasized that the pulsations produced in this experiment were the results of boundary layer and shock interaction and were not due to burner roughness.

▶ **Downstream Influences**—When shock oscillations occur because they have been triggered by a downstream disturbance such as burner roughness, the problem is, as above, to eliminate the pulsations. This is best done by eliminating the trigger, in this case the compressive disturbances which travel upstream against the flow.

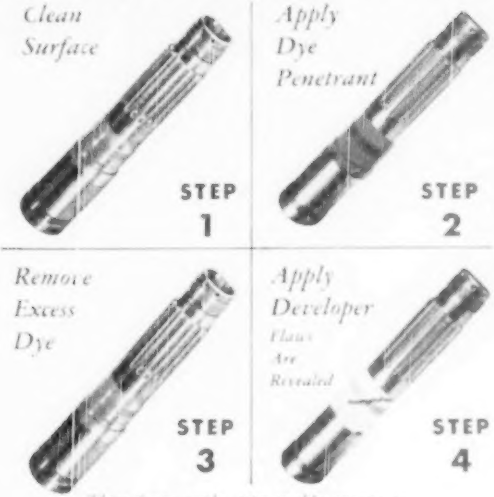
Dr. Ferri, of NACA, proposed a scheme for reducing the strength of these disturbances which generate shock oscillations. His device is an asymmetrically shaped body splitting the subsonic flow channel into two smaller channels of unequal area and velocity.

Any disturbance traveling upstream is divided upon contact with this body. In transit through the two channels, one weak shock is slowed more than the other because of different flow velocities in the two channels. Upon leaving the channels, the shocks tend to spread across the entire cross-section, forming a final configuration of two disturbances each having about half the intensity of the original.

When asked how this scheme works against a flow of increasing velocity and pressure—typical of ramjets—one NACA expert said that further research was underway on the subject, but it was unfortunately classified.

These studies by NACA constitute another major contribution to the new hypersonic [illegible] phase becoming increasingly important to aeronautical engineers.

NEW INSPECTION METHOD



These four simple steps enable anyone to determine the location, extent, and nature of surface flaws or discontinuities in any metal.

Four Simple Steps for Easy, Economical Quality Control & Preventive Maintenance

The Dy-Chek inspection process involves the use of three special liquid compounds, non-corrosive and easily applied by brush, spray, or dipping. STEP 1—Clean surface with Dy-Chek Cleaner; STEP 2—apply red Dye Penetrant; STEP 3—remove excess Penetrant with Cleaner; STEP 4—apply white Developer …brilliant red indications appear quickly if flaws are present.

Requires no electricity, lights, or special installations

The only requirements for Dy-Chek inspection are the three liquids, and simple equipment — such as brushes, sprays, or dip tanks — for applying the liquids.

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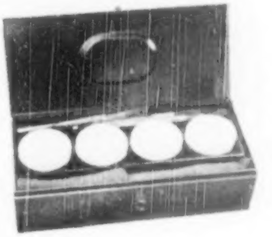

Complete portability takes rigid inspection into the field for use by anyone without special training. Dy-Chek's low cost extends precise inspection to even the smallest companies. Ample supplies for inspecting large areas of metallic surface can easily be carried to any location. On the other hand, the simplicity of the process lends itself equally well to installation in a plant for production-line inspection.

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DY-CHEK, THE DYE PENETRANT METHOD OF INSPECTION* permits *anyone anywhere* quickly and conveniently to inspect *any* metal for flaws or discontinuities having surface openings. Castings, forgings, machined parts, plate, sheet, tubing, weldments … aluminum and its alloys, cobalt, copper and its alloys, iron and its alloys, magnesium, nickel and its alloys, etc. … magnetic and non-magnetic … all can be surface inspected by the Dy-Chek process. *The surface need not be smooth.* Dy-Chek is a proven economical process developed by Northrop Aircraft Research, and is *already widely used in many industries.*

*Pat. Pend.

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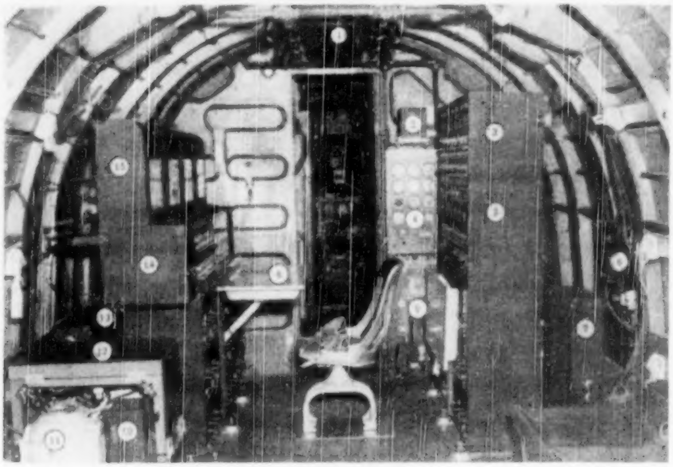
Pilot's Job Analyzed In Psychology Lab

Searching studies aloft aim to create efficient pilot-equipment team.



How the AMC airborne psychology laboratory is fitted: 1, Console lighting; 2, motion picture camera; 3, vertical speed variable; 4, duplicate flight instruments; 5, scoring console; 6, power-distribution box; 7, scoring junction box; 8, desk; 9, variable panel; 10, photoelectric amplifier; 11, vertical-flight gyro; 12, sound recorder; 13, servo junction box; 14, the recording console; 15, charting screen showing four recording units.

Engineering psychology is being used to cut a path through the jungle of cockpit gadgetry. Aim: To make the pilot's task easier and safer through simplification of controls and equipment.

Researchers at the Air Materiel Command have long recognized that the swing of the aeronautical pendulum has taken the pilot from early conditions of too few instruments and a paucity of controls, to a complex and frequently confusing array of cockpit telltales and devices. And vitally important: these installations must be keyed to a minimum human response time.

This demanding situation is being attacked from a psychological angle because:

- Engineers who are designing instruments, controls and cockpits have relatively little exact scientific information on psychological problems encountered in aircraft operation.
- "Best judgments" of a few engineers or pilots have been substituted for scientific facts.
- Pilot preferences for new equipment designs have been the subject of many arguments, but few research investigations.

▶ **Psychology Aloft**—Pushing for equipment design solutions, AMC engineers have teamed with the organization's Aero Medical Lab scientists. They have fitted an airborne laboratory—a C-47—with special electronic devices for checking action and reaction of pilots operating complex instruments and controls.

What these technicians are doing is analyzed by Maj. E. L. Cole and Lts. L. L. Milton and R. R. McIntosh of AMC's engineering division, directorate of research and development, in a recent issue of the Central Air Documents Office's Technical Data Digest.

Scoring devices in the airborne lab show how closely pilots can hold heading, altitude, airspeed and other variables.

▶ **What They Use**—The basic equipment comprises a motor-generator, sensing units and scoring and recording consoles.

Motor-generator is a single-phase, [illegible] 115v., a.c. plant adjusted for continuous output up to 20,000 ft.

Sensing units are potentiometers and hydraulically operated pickups. The latter's mechanical responses to control movements are translated into electrical impulses amplified to actuate the scorers and recorders.

An instrument panel which partially duplicates the pilot's gives flight indications.

Pickups for control pressures and positions are located on under-floor control cables.

▶ **Precise Clocking**—For scoring, electric stop clocks show quantitative direct indications of the time these variables are maintained within various tolerances: Airspeed, ±1.5 to ±10 mph.; altitude, ±20 to ±100 ft.; pitch, ±1 to ±5 deg.; angle of bank, ±1 to ±12 deg.; rate of turn, ±20 to ±90 deg. per min.; inclinometer, ±⅛ to ±½ ball width; vertical speed, ±50 to ±300 fpm; heading, ±1 to ±5 deg.; glide path, ±12.5 to ±100 ma; localizer, ±12.5 to ±100 ma.

While the tolerance is held the scoring clock operates. It stops whenever the flight variable deviation exceeds the tolerance setting. Hence total proficiency in flight variable control is obtained by comparison of time within tolerance with total time of problem.

▶ **Graphic Analysis**—Recording system incorporates direct-reading graphic traces furnished by an electronic servo system operating from the same variable measuring device giving scoring data.

Graphic records of these variables are obtained: Aileron, elevator, rudder, throttle and prop governor positions; elevator, rudder and aileron pressures; also airspeed, altitude, angle of bank, vertical speed, glide path, localizer, rate of turn, pitch, inclinometer, and control wheel grip tension.

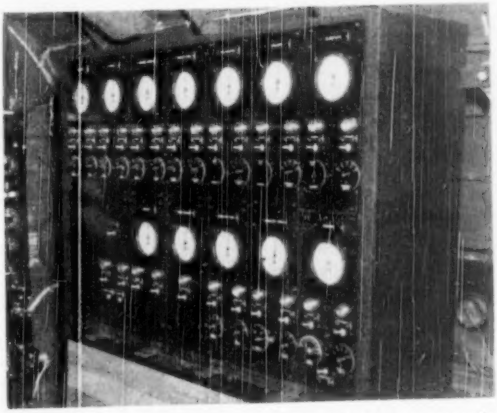
The calibrated charts of the recording system give a continuous detailed record which may be analyzed subsequently. Thus, deviation from desired values, pilot coordination and interactions between control pressures, movements and instrument reading can be studied. Another example: The plotted score of holding airspeed can be compared with recordings in other periods under different conditions.

▶ **Limit Action**—Each variable, directly or via mechanical and electrical linkage, activates a microtorque potentiometer in an a.c. bridge circuit. Tolerance setting determines the position on the potentiometer, hence the value of the variable at which a phase reversal or reversal in polarity occurs.

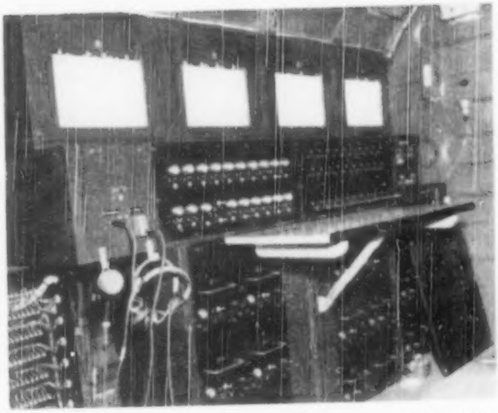
The bridge circuit signal is amplified and fed to dual-phase discrimination circuits which start or stop the clocks, depending on whether the variable is within the limits of the points of phase inversion.

The microtorque potentiometers also feed into servo-amplifier circuits which actuate motors that position the scoring pens to correspond to wiper arms of the potentiometers of the sensing variable.

Other equipment includes a pilot's voice recorder, motion picture camera to catch his body and eye movements, and an air-turbulence meter to provide an index of average turbulence during the problem.



Scoring console utilizes clocks, centering and tolerance controls, switches, indicator lights, signal transmitters for each variable



Recording console complements scoring apparatus and includes direct reading graphic charters as well as switches, lights, signal units

Thus, data obtained under various weather conditions can be reduced to a common reference level.

▶ **Fatigue Flights**—One study the researchers are pushing is development of objective measurements of fatigue aspects that influence pilot effectiveness.

Basically, the problem is: How long can he perform his duties effectively without increase in error or time?

To supply some of the answers, three pilots were subjected to 17-hour flight trials in the airborne lab. Check equipment included a reaction light on the instrument panel, with turn-off switch below the throttles; also, an alertness indicator consisting of an electrode band on pilot's forehead, connected to an oscilloscope to measure frequency and amplitude of change in electrical potential of skeletal muscles and muscle groups. To simulate instrument flying conditions, a special hood was used.

Flight pattern consisting of straight and level flight and precise maneuvers was begun at a predetermined altitude and followed by pilot in accordance with written instructions. He was unaware of periodic scoring. The reaction light was turned on every 15 min., a clock recording the time to notice and turn off. Ten alertness readings were taken at 15-sec. intervals every 15 min.

And further checks of fatigue included reading, addition and illusion tests.

▶ **Fatigue Findings**—Here are some typical results found by the researchers:

- Progressively marked deterioration in holding variables within limits with passage of time, yet subject believes he is holding them at end of flight as well as he did during first few hours.
- Increased likelihood of forgetting routine tasks.
- Loss of proficiency in operations involving complex skills and division of attention.

▶ **Lighting Studies**—Cockpit and instrument lighting factors are another major concern of the researchers.

There is little standard data available regarding preferred light intensities and different intensities required for various conditions in night flying.

Since it is assumed that lighting effectiveness is reflected by pilot's performance, the airborne lab's electronic scoring and recording equipment lends itself to determining how he carries out his duties under a variety of intensities of different lighting installations.

▶ **Systems Used**—Five systems are available in the flying lab's cockpit: Conventional ultraviolet for both pilot and copilot; indirect red-Lucite edge-lighting of instruments on pilot's panel; indirect red edge-lighting of Navy dish-pan type for instruments on copilot's and engine-instrument panels; and red and white flood-lighting, respectively, for entire panel and cockpit interior. Overhead radio control and switch panel has plastic back-lighted identification plates.

Rheostat controls for the systems give a wide range of intensities.

▶ **Design Approach**—Basic data on pilot's eye movements already have been obtained with a camera and panel-mirror technique. The information has shown frequency with which instruments are checked in particular maneuvers, time required for checking each instrument, percentage of total time available in critical maneuvers that is spent obtaining information from each instrument and pattern used in instrument cross-check.

Results obtained with the airborne lab's check scores and recorder are supplementing these data to help judge various designs of present instruments and their arrangement on the panel.

▶ **Reference Aspects**—Another important problem the airborne psychology lab technicians are probing for a solution is evaluation of earth- versus airplane-reference principles for flight instruments.

Question is: Should the flight instruments represent what the earth is doing during a particular maneuver or give information as to what the aircraft is doing?

Flight instruments now used, the researchers feel, are not consistent in this matter. Because of this lack of reference factor consistency, and the additional drawback of no available information concerning advantages of either reference-type instrumentation over the other, the airborne lab should come up with some clarifying answers based on actual piloting results.

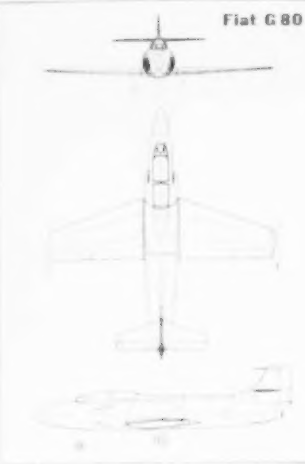
Generator Bearing Failures Reduced

Generator failures have almost ceased to plague United Air Lines as a result of a new technique for installing generator bearings.

Before the method was discovered, UAL had as many as two generator failures per week on R-2800 engines. Failures were traceable to engine vibration, causing increases in clearance between the generator bearing, shaft and bearing liner. As a result, armatures wore out, and there was a constant need for generator repair and replacement, entailing increasing costs.

But the difficulty has been virtually licked, says United, by fitting the main bearings of the generator with microscopic accuracy. Prior to assembly, measuring devices are used to fit each bearing and mating part to within 15/100,000 in. Bearing segment is chrome plated to produce a hard surface and then ground to an exact fit.

UAL's general manager of engineering, W. C. Mentzer, says this technique will save the transport industry thousands of dollars annually.



Fiat G.80: First Italian Turbojet Plane

Designed for training; interchangeable nose sections permit use as fighter or photo-reconnaisance craft.

(McGraw-Hill World News)

Italy's first turbojet aircraft prototype has been rolled out of the hangar doors of the Fiat works. Designated the G.80, the plane is primarily intended for training purposes, for which role it is a tandem two-seater.

Development of the craft is a notable step forward in the renaissance of the Italian aircraft industry. Sparked by licensing agreements with de Havilland (Aviation Week Dec. 19, 1949), Fiat staked out a large claim for itself in the fields of postwar aeronautics.

The G.80 is its first parallel strike.

Basic lines of the airplane are clean and conventional, with some evidence of British and American influence.

▶ **Fuselage**—Three separate sections make up the G.80 fuselage. The forward section contains the nose wheel and gear, cockpits for the pupil and instructor (both fitted with Martin-Baker ejection seats), some equipment and the air inlets for the engine. The midsection appears to be an integral fuselage and wing center-section, the structural guts of the airplane. Here the engine is mounted, the outer wing panels attached, and the main landing gear wheels housed.

Engine tailpipe and tail surfaces are the third section's major components.

The design features interchangeable nose sections, which can be quickly installed, permitting use of the craft as a single-seat fighter, a night fighter or a photo-recon plane.

▶ **Conventional Wing**—Planform of the wing is trapezoidal, with a straight trailing edge. Two outer panels mount on the center section stub wing, which is part of the fuselage midsection. Wing area can be increased by the substitution of alternate panels, presumably for training purposes.

Structure is two-spar with stiffeners, the forward spar being at about the quarter-chord line, the after spar at about 60 percent.

▶ **Fuel Supply**—Tankage is provided in six places: two in the center section, which carry 251 gal. total, and two in each outer panel, with a total capacity of 400 gal. Wingtip tanks, each good for 66 gal., can be fitted.

Completely tanked, the total fuel capacity is 489 gal.

▶ **Power Plant**—Engine for the G.80 is a de Havilland Goblin 4, which delivers 3000 lb. sea level static thrust. Although Fiat has license rights from de Havilland for building Goblins, the chances are that the engine in this particular prototype is one purchased from de Havilland.

▶ **Equipment**—Standard day and night flying instrumentation is installed, with a two-way, 10-channel VHF radio, oxygen and cabin air conditioning.

▶ **Performance**—Available performance data for the G.80 appear to be design figures, and they are reproduced here with that reservation. At takeoff, the gross weight is 11,000 lb. Sea level rate of climb is 5120 fpm; 4 min. and 4 sec. after takeoff the G.80 is climbing past the 19,700-ft. mark to a service ceiling of 44,800 ft.

Top speed on the deck is given as 547 mph., which is a creditable performance. Maximum range is 840 mi., achieved at an altitude of 29,550 ft., with 2200 lb. of fuel aboard.

▶ **Some Analysis**—Although no dimensional data were made available, some reasonable estimates may be obtained. Based on the fuselage diameter necessary to contain a Goblin 4, the wing span comes to about 32 ft., and the overall length to about 37 ft. Wing area is around the 225-sq.ft. mark, which would make takeoff wing loading 49 psf.

The G.80 owes some of its lines to the Lockheed F-80 configuration, and none of them to previous Fiat design practices. The designers have turned out a straightforward, even conventional, jet aircraft which has better than average performance in this first Italian pure turbojet plane.

NACA's Icebox

Firing a bullet through an icebox is a cheap and convenient way to produce hypersonic Mach numbers, says the National Advisory Committee for Aeronautics in Tech. Note 2120.

Faced with the problem of finding an inexpensive, expedient technique for duplicating hypersonic effects, NACA used the ballistic range idea combined with a refrigerated test chamber.

In use, the test section is cooled with liquid nitrogen. A commercially available .220-cal. high-velocity rifle fires projectiles through the test chamber. The resulting shock patterns are photographed, using the spark shadowgraph technique.

Speeds of the order of Mach 7 have been obtained, says NACA.

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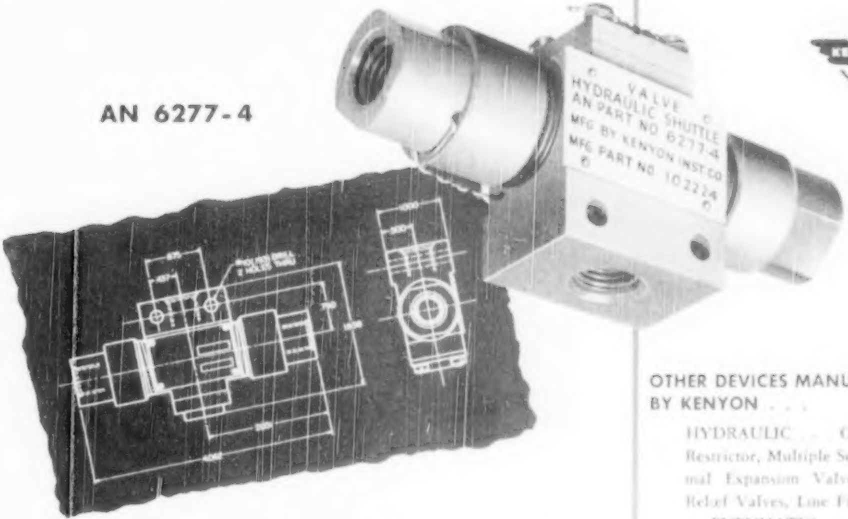

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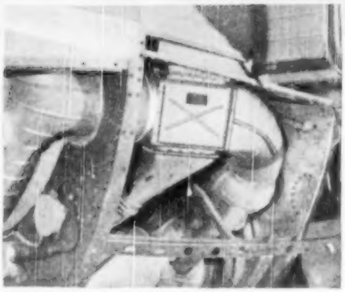
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Relative Market Action

Listed Aircraft Common Stocks

Company	1946 High	1947 Low	Dec. 31, 1949 Close	July 19 or 20 1950 Peak
Beech*	16	8	7¾	10¼
Bell	30	11	14⅞	19⅝
Boeing	33	14	20½	31⅝
Convair	44	11	10⅝	17½
Curtiss-Wright	12	4	7⅞	10½
Douglas	100	43	72½	90
Fairchild Engine	8	4	3⅞	7½
Grumman*	26	9	19⅝	31⅞
Lockheed	45	11	25	36⅛
Martin	40	7¼	10⅝	17½
No. American	17	7	11¼	16⅞
Northrop	16	5	6¾	9½
Republic	23	4	6	10¾
United Aircraft	37	17	28½	33¾*

Notes: No adjustments made for cash dividends paid.
All fractions omitted for 1946 and 1947 quotations.
* Adjusted for stock splitups.

Aircraft Shares Advance Sharply

Reaction to Truman's $10-billion armament request sends plane stocks to their highest level in years.

Aircraft shares have been in the forefront of market advances as the impact of the President's $10 billion armament measure impressed investors and speculators alike.

As a result, market prices for most aircraft equities have risen sharply and are now at their best levels in years.

Aircraft shares have always fluctuated sharply and have known little stability for any sustained period. The ever-changing pattern of the industry has been responsible for this condition.

Unfortunately, aircraft stocks have become identified as "war babies" and, as such, respond quickly to any changes in the military climate. This recent burst of enthusiasm shows little discrimination but has spilled over to the entire aircraft list. Yet, remaining to be answered is the allocation of orders to the separate companies and, most important of all, the ability of some companies to translate increased bookings to profitable results sufficient to justify current and projected market quotations.

▶ **Taxation Factor**—Until the effects of increased taxation upon gross earnings are fully evaluated, a major factor in the aircraft industry's outlook remains undefined.

While there has been considerable conjecture, there are as yet no clear indications as to the exact form of the new tax measure designed to finance the current $10 billion overall program. Excess profits taxes certainly are indicated. But will they be premised on invested capital, prewar or postwar earnings, or a combination of elements? This phase must be defined and related to the separate aircraft companies before any projection of earnings can even be assumed.

This much is certain: National policy will dictate that there will be no profiteering as a result of the present emergency. Further, responsible industry leaders have long been careful to avoid conditions which would bring forth charges of excessive profits on government contracts.

▶ **Equity Reaction**—It is interesting to note how aircraft equities have reacted to events since the war period. For the most part, postwar peaks in market prices were established during 1946. These new highs were sparked by strong financial positions built by war work, along with optimistic predictions by some observers of a strong continuing demand for military aircraft, together with the hope of new markets in commercial business. Significantly, these postwar highs, established in 1946 with one exception, remain the peak market points for the listed aircraft shares.

As backlogs diminished and resources in some instances were dissipated through ill-advised extraneous ventures, a great deflation took place in market prices of all aircraft shares. This slide continued to early in 1947 when the bottom was reached for most aircraft equities. (The two exceptions to this trend were Convair and Martin which sold at 8 and 7¼ respectively, during 1949.) The general price deflation took most aircraft equities to fantastically low levels showing little relation to liquidating values for current assets and little regard for minimum earning power.

▶ **Defense Necessity**—As the President's Air Policy Commission came into being during 1947, there was a general awareness that something was going to be done for the aircraft industry through the sheer necessity of meeting basic national defense requirements. Having very much the same objectives, the Congressional Aviation Policy Board helped foster this more encouraging attitude toward the industry.

These moves sparked a market recovery of major proportions which continued well into 1948. Real impetus was provided by the increased aircraft appropriations. This impact continued, on a highly selective basis, throughout 1949 and into 1950.

As each individual company demonstrated its ability to generate improved earning power and to move ahead in outlook, its equity tended to rise above the general industry trend. For this reason the lack of uniformity in aircraft stock price movements became more pronounced than ever before in the recovery that followed from the 1947 lows.

▶ **Stock Milestones**—The accompanying table shows significant milestones for 14 of the major listed aircraft common stocks.

Grumman stands out as the only issue which thus far has surpassed the market peak established in the past postwar or war period. This accomplishment was achieved prior to the Korean incident. In this instance the almost persistent gains, marketwise, have matched the earnings record and outlook of the company.

Many market analysts frequently fall into the fallacy of believing that because an issue once sold at a certain peak quotation and is now available at but a fraction of that price, it is very likely to trace a recovery back to its old high. Such a policy simply ignores the fundamentals affecting the industry and individual companies.

▶ **Year-End Recoveries**—It can be seen from the accompanying table that most aircraft equities recorded sharp recoveries at the 1949 year-end in comparison with their 1947 lows. On the other hand, the greatest relative gains, on the whole, have been made in the recent boom atmosphere affecting aircraft issues.

The current boom in aircraft procurement, while of infinite temporary gain to marginal producers, will leave its imprint in the position and outlook for all aircraft companies. As prospects change so does the selectivity pattern of aircraft equities. Lack of uniformity in price movements will be just as pronounced in the future as it has been in the past.

—Selig Altschul

C-W Leads in AF Contracts List

Other large awards as fiscal year neared end include GE, Lockheed, North American, Boeing and Convair.

Contract awards by Air Force as it neared the close of its fiscal 1950 procurement expenditures found Curtiss-Wright Corp. leading the field in the next to the last month with $12,265,331 in miscellaneous contracts and General Electric running second with a total of $8,490,941.

Contracts in the Air Materiel Command's new release, listing May business, were too early to reflect a rise in procurement due to the Korean incident. Nor do they include confidential procurement.

Individually, the contracts are small dollar-wise and represent, for the most part, miscellaneous items of equipment and repair held in abeyance, in favor of major USAF procurement needs, until the end of fiscal 1950.

• **Curtiss-Wright**—Curtiss-Wright Corp. received a $6 million contract for reconditioning approximately 50 B-29 Superfortresses, most of which are scheduled to go to Great Britain under terms of the Mutual Defense Assistance Program, $250,000 for overhaul of V-32 auxiliary power units, $53,768 for propeller assemblies in Wright 4360-35 engine tests, and $275,160 for prop assemblies for Lockheed C-121 aircraft.

Two other major contracts awarded to Curtiss-Wright are $4,555,623 for supply of B-36D aircraft parts and $1,122,800 for supply of prop spinners and spare parts for the Boeing B-50.

• **General Electric.** Fattest contract awarded to the General Electric Company was $6,610,961 for J-47 jet engine spare parts and overhaul tools. Electronic equipment, fire-control systems and miscellaneous engine parts accounted for the remaining $1,879,980. But many of the contracts awarded to GE were confidential in nature and military sources indicate that total volume of contracts to GE very likely exceeded the $10-million mark for this period.

• **Lockheed.** Lockheed Aircraft Corp. top contract was $1,025,830 and was awarded for supply of F-94B jet fighter spare parts. $690,125 contract was awarded for two-place T-33A (F-80) jet trainer spare parts. Lockheed also received $500,000 for rehabilitation of approximately 40 F-51s. The remaining $1,255,994 was awarded for miscellaneous items of equipment, repair, modification and spare parts.

• **North American.** North American Aviation Corp. received $1,184,151 for storage, repair and modification of an undisclosed number of B-45 light jet bombers, $72,088 for B-45 modification kits, $67,993 for design installation and test of special radio antenna for the B-45 bomber.

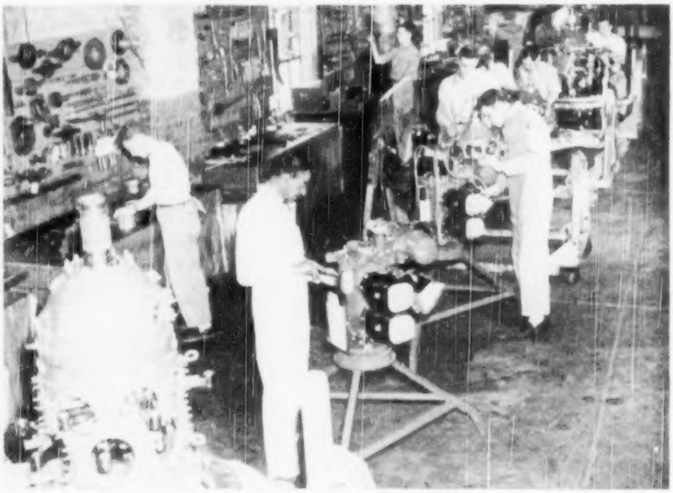
North American also received a $788,655 contract for supply of F-93 spare parts and $50,795 for supply of F-86A spare parts. Remaining awards totaling $465,777 included $10,404 for a "mobilization program study" and various items of equipment and repair.

• **Boeing.** Boeing contract awards totaled $2,521,839 including $900,954 for B-29 spare parts, $887,222 for C-97C spare parts, $51,316 for B-50 spare parts, and $160,000 for special tools and ground handling equipment. Boeing was also awarded $561,514 for a producibility study of the B-47. An additional $250,853 was awarded for various parts, instrumentation of one B-50A and for C-97 engineering change kits.

• **Convair.** Consolidated Vultee Corp. received an additional $1,825,413 for converting B-36B bombers to B-36D versions with four outboard jet pods.

• **Bendix.** Bendix Aviation Corp. received $1,970,992 in miscellaneous contracts during the month of May for various items of equipment.

A complete list of the May contracts of $5000 and more will appear in subsequent issues of Aviation Week.



DURHAM ENTERS ENGINE OVERHAUL FIELD

Durham Aircraft Service, Inc., aircraft, instrument and accessory servicers, has taken a long-term lease on the engine overhaul facilities of Engine Air Service, Inc., near Roosevelt Field, L. I. Durham plans eventually to acquire the property outright. The new setup gives DAS complete facilities for custom servicing plane powerplants from four-cylinder Continentals to P&W R-2800s. The layout, covering 15,000 sq. ft. employs 75 under the direction of George L. Staley. It is valued at $250,000. Work now in progress includes several Air Force contracts for overhauling "O" type engines.

PRODUCTION BRIEFING

▶ **Cleveland Pneumatic Co.** has acquired the license and manufacturing rights of the British Dowty liquid spring shock absorber for airplane landing gear. A shock absorber strut, designed and built in Cheltenham, England, using pre-stressed cylinders and silicone fluids, has been supplied to Wright-Patterson AFB for installation on a B-50.

▶ **Airwork Corp.** plans to expand engine overhaul facilities by 7000 sq. ft. at Millville, N. J.

▶ **SKF Industries, Inc.** is placing production of precision anti-friction bearings under separate manufacturing supervision to make better utilization of special techniques in producing bearings for aviation uses.

LETTERS

From a Noted Pilot

Naturally, I'm in complete accord with your blast on the railroads and their advertising. Personally I hope someday we put them out of business. . . . If for no other reason than the snappy "get out of here you bother me" treatment they dish out.

But while we look at advertising, I think the aviation industry should look at its own intra-industry advertising, often the kind that appears in your fine magazine. I speak of the "shading" that the copy often gives.

In the last issue a radio ad makes you believe that a pilot over the Atlantic just picks up the mike at any time and bingo, he talks to the ground. Well of course any Atlantic pilot can tell you this can happen a lot of the time, but not all the time by a long shot.

Another pet gripe of mine is the bold statements some copy writers make about "pilots unanimously accept." Having been a good ALPA member for the past thirteen years I can count on the fingers of one hand the times the pilots have been asked for an opinion on commercial products.

GCA and Gander is a good example. While it may be that the majority of instrument approaches are made there by GCA, it's never mentioned that Gander does not have an ILS system. (A sad thing, too.) The range approach has higher minimums so naturally GCA is used.

The thing that is bad about this "shading" is that the copy, ideas and notions get into the hands of the public and then the public seems surprised to find that we don't land zero, zero, and that we don't have radar to see "things" and find out too that we don't go nonstop around the world etc., etc. It falls the lot of the pilots and cabin flight crews to have to admit to these fallacies when cornered by a passenger. It embarrasses us and destroys a certain amount of confidence the passenger had.

As we both know, the aviation industry has enough on the ball to make all the other forms of transportation appear in their true archaic light. Let's stick to these facts and stop the "shading."

ROBERT NITZEL BUCK
137 Brightwood Ave.
Westfield, N. J.

(Bob Buck is a pilot on TWA's international service.—ED.)

This Sells Aviation!

After reading your editorial . . . June 12, "Risking Death for Thrills," I thought the enclosed account of our Courtesy Flight Day might be of interest to you as a new and unique method of promoting safe flying to the public.

With the exception of Erco Field, where the operator, Richard Sanders, donated the gas and oil, the club members and individual plane owners who participated from noon till 6 p.m. on Sunday, May 21, donated their time, planes, gas and oil to make the day the success it was.

We plan to make Courtesy Flights an annual event for the Washington area. . . .

LOUIS A. BARR, President
Washington Assn. of Flying Clubs
910 N. [illegible] Street
Arlington, Va.

(Mr. Barr's announcement says more than 500 persons were carried "in the biggest free shuttle-service sightseeing program ever launched in the Washington area." The amateur pilots used seven airports. All comers got free rides. Licensed pilots used their own planes.

Three passengers were youthful priests. They anticipate duty in the Philippines, where the order owns and uses a lightplane. A 26-year-old pastor came down thoroughly sold on aviation and "ready to take up flying lessons." Oldest passenger of the day was 77. She announced complete satisfaction and decided she wanted to take a night flight as soon as possible.—ED.)

For an Exposition

Your splendid magazine comes to my attention every week, both because my company is an advertiser and because I am an interested reader. And I was especially interested in your editorial, "Abolishing the Races" in your July 3 issue.

Now I write you belatedly to laud you on your foresight and courage in printing such a strong and factual editorial. How right you are! And I only hope that your comments are widely read. It is to be hoped that your editorial will have the result of forever abolishing the National Air Races as such.

I do believe there is a place in the industry for an institutional exhibit or exposition.

I think we might take a page out of the railroads' books. They did a marvelous "selling the public" job with its Railroad Exhibit and Exposition at Chicago the summers of 1948-1949. It was the sort of a show that would lend itself admirably to aviation.

Why not spend our money along these or this direction? Then we would be making a sound effort for the industry, and letting the public see behind the scenes of a practical, fast and safe means of transportation. In this manner, public confidence can be built.

Again I salute you on this fine editorial. [illegible] for the aviation industry.

[illegible] KYLE MILLARD
[illegible] Sales Division
Sales Department
The Texas Company
New York 17, N. Y.

Water-Based Aircraft

It seems possible that [illegible]

Already we can see that our operations in Korea have been entirely dependent on a few poor airstrips which were, at best, suited only to a small number of older types of aircraft, and quite useless to large or fast-landing aircraft for supplies, reinforcements, evacuation or ground support.

With these strips lost, damaged or threatened, our transport facilities are virtually useless and our modern landplane fighters must be based so far away that they can remain only a few minutes over the scene of operations. . . .

Yet all around the Korean peninsula there are dozens of ready-made and indestructible water airports under our full control and protection—and our Air Force is entirely without any aircraft which can use them.

There are no sound reasons for assuming that future warfare will follow the same fortuitous pattern which, in the last war, permitted us to advance slowly over routes where hastily built land runways were feasible.

On the contrary, it is too easy to imagine other war conditions where land runways to suit large and fast modern aircraft will be unavailable or untenable and where water bases only can be used. Elementary precaution suggests that at least some part of our Air Force equipment and organization be available for such conditions.

Unfortunately Air Force thinking has long been cursed by the ghost of the "Flying Boat." Water-based aircraft, their experts assume, are "flying boats"; being boats these are the Navy's business and no concern of the Air Force; and since the Navy always wanted rough-water craft for long and slow patrols (craft which were boats first and aircraft where possible), therefore all water-based aircraft must be slow and inefficient; therefore the Air Force has no use for aircraft which can use water runways.

Apparently the Air Force feels that if it should ever appear desirable, it can call on the Navy for "flying boats" and then, presumably, blame them if they haven't any either. And there is no special reason why the Navy should have any; the subject is aircraft, not Navy vessels, and the Navy now gets more fun out of carriers than "flying boats."

So deeply has the [illegible] been implanted that not even a fair hearing can be obtained by those of us who know that, given a reasonable chance and freedom from "flying boat" traditions, designers can produce water-based aircraft which, in virtually any category, can equal or surpass land planes in overall efficiency.

This is no place to resume the old and usually fruitless "landplane versus flying boat" argument. The essential factor would seem to be beyond argument, namely, that there is something seriously missing in an Air Force which, presumably intended for world-wide operations, has no aircraft which are capable of using the world's vast areas of "ready-made airport" water.

FRANK T. COURTNEY
2312½ No. Beachwood Drive
Hollywood 28, California

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ARMSTRONG SIDDELEY PYTHON
TURBO-PROP

* The first turbo-prop aircraft successfully to complete deck landing trials was the Fairey 17 powered by an Armstrong Siddeley Double Mamba turbo-prop.

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Parkside, Coventry, England
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AIR TRANSPORT

CAB Proposes New Pilot Standards

Airline reaction expected to be cool; ALPA may ask higher pay levels because of stricter requirements.

Airline pilots and copilots will be required to qualify for new ratings geared more closely to the airmen's experience and skills if new federal regulations, now under consideration, are adopted.

The proposal involves establishment of two classes of airline transport certificates. Crewmen holding only a commercial license and an instrument rating would no longer be able to act as copilots on airline planes.

Individuals as well as airlines and employe organizations affected by the contemplated changes are being urged to comment on them. Comments must be received by the Civil Aeronautics Board's Bureau of Safety Regulation not later than Sept. 15.

► **Senior Certificate**—Top classification under CAB's suggested revision of Part 21 of the Civil Air Regulations would be the "Senior Airline Transport Pilot certificate." This ticket would be issued only to those pilots showing the highest competence and experience in handling today's larger and more complex equipment.

To obtain a Senior Airline Transport Pilot certificate, a crewman would be required to have 2000 hr. minimum flight time as a pilot, including 500 hr. as pilot in command and 500 hr. in multi-engine aircraft of not less than 1500 maximum continuous horsepower.

► **Second Grade**—The other grade of Airline Transport Pilot certificate could be obtained with a minimum of 750 hr. flight time, including 250 hr. as pilot in command. (Current commercial rating requires 200 hr. of flight time; and the airline transport rating requires 1200 hr.)

The new Airline Transport Pilot certificate would authorize the holder to be pilot in command of:

- **Passenger operations** of plane types having a maximum certificated takeoff weight of less than 12,500 lb.
- **Cargo operations** using planes of less than 30,000-lb. weight (roughly DC-3 size and smaller). He would be permitted to fly as copilot on planes of less than 80,000 lb. (DC-4 and smaller).

► **Master Category Eyed**—In setting up these two grades of certificates, CAB's safety bureau also considered establishment of a third grade to be called "Master Airline Transport Pilot." It was suggested that an applicant for such a grade have a total of 5000 hr. as pilot, of which 500 hr. should be as pilot in command. At least 1000 hr. of the master airline transport pilot's total hours would have to be as pilot in multi-engine planes of not less than 1500 maximum continuous horsepower (Martin 2-0-2, Convair-Liner, or larger).

Under the three-grade set-up, the master pilot would be permitted to captain any type of plane, while the senior airline transport pilot would be limited to acting as captain only on planes having a maximum certificated takeoff weight of less than 50,000 lb.

CAB tentatively decided that establishment of three grades of airline transport pilots is not necessary. Nevertheless, it does not consider the issue settled and has also asked for comments and suggestions on this subject.

► **ICAO Standards Compared**—The proposed Civil Air Regulations revisions are in line with personnel licensing standards being weighed by the International Civil Aviation Organization. However, in a number of respects the U. S. standards would be more stringent than the rules being considered by ICAO.

It is believed that over 75 percent of scheduled airline captains and almost as large a proportion of nonscheduled airline captains could qualify for the new Senior Airline Transport certificate. If the master category were set up, it is estimated that at least 70 percent of the regular trunkline pilots could qualify for this top grade. (Feeder airline pilots operating planes no larger than DC-3s would have no occasion to need the master certificate.)

Possibly more than half of the scheduled airline copilots could also qualify for Senior Airline Transport certificates. Big question is whether the carriers would go to the expense of qualifying any more copilots than necessary for the senior rating.

► **Nonsked Problem**—The proposed rule changes might go far toward boosting the quality of nonscheduled airline crews. Federal safety officials have been worried about this problem for some time. At present, an 18-year-old pilot with only 200 hr. of solo time in any powered aircraft can qualify for a commercial license and become a copilot.

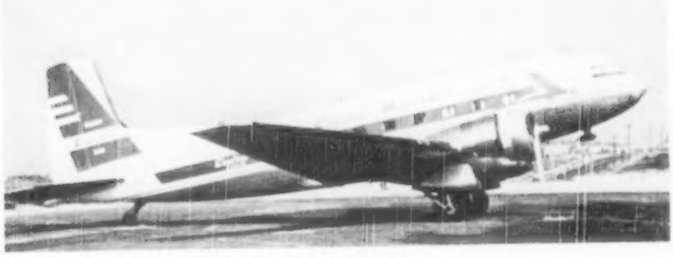
Neither the airlines nor the Air Line Pilots Assn. has taken an official stand on CAB's proposals. But it is conceded that the changes could have a major effect on existing contracts between the carriers and the union.

► **Pay Differentials**—ALPA would undoubtedly request a substantial pay differential for senior rating as compared with holders of the Airline Transport Pilot certificate. Moreover, since copilots now holding commercial licenses would be required to qualify for Airline Transport Pilot certificates, the union might seek higher wages for this group.

Airline officials, who are generally allergic to new regulations, may balk at the CAB pilot proposal. They want flexibility in their crewmen and deplore the "bureaucratic tendency" toward increasing specialization of personnel.

CAB proposes that all pilot certificates with Airline Transport ratings issued prior to the effective date of the suggested Part 21 revision would expire on Jan. 1, 1951. On or before that date, each holder of an ATR would be required to exchange his certificate for an Airline Transport Pilot certificate appropriate to his experience qualifications as specified in the new rules.

Such pilots would not be required to take any examination. They would be issued the same airplane or helicopter



CAPITAL DEBUT

This Super DC-3, first to go in commercial operation, will provide faster twin-engine service along main Capital Airlines routes. The Washington-Atlanta run was to receive the first service from the carrier's fleet of three new Douglases last week. Capital says its 1951 model of the famous Douglas workhorse can cruise at 250 mph. Carrier also started operation with first of five new Connies on Washington-Chicago link.

ratings as those held by them on the date of exchange.

▶ **Examinations Required**—Holders of Commercial Pilot certificates issued prior to the effective date of the new regulation and who meet the experience requirements of the new rules would be issued Airline or Senior Airline Transport Pilot certificates and appropriate ratings after passing the necessary examinations.

Applicants for the proposed new Airline Transport Pilot certificates with airplane ratings must be at least 21 years old. If they do not already hold a commercial license they must pass a more extensive written examination. In addition, all except those who are exchanging their ATRs for a new certificate must demonstrate their skill as a pilot by passing practical tests covering preflight planning, equipment examination, preflight plane check, taxiing, engine runup and flight maneuvers under normal and instrument conditions.

Applicants for senior certificates who lack an ATR would take written and flight tests similar to those prescribed for the Airline Transport Pilot certificate, but candidates for the higher rating would have to make better grades on the examinations.

Safety Crackdown Hits Nonskeds

Recent accidents bring stricter CAB safety regulations eliminating maintenance and operations loopholes.

Federal agencies are adding stringent new safety regulations to the severe economic restrictions that have already made life miserable for the nonscheduled airlines (AVIATION WEEK June 12, p. 43).

The new safety measures stem from recent accidents suffered by uncertificated carriers on the U. S.-Puerto Rico route. Both the Civil Aeronautics Board and Civil Aeronautics Administration have been particularly concerned over C-46 crashes which indicated sloppy maintenance or operations by the irregulars.

Investigation of the latest mishaps has not been completed. But CAB said an emergency exists which requires immediate action to tighten up provisions of Parts 42 and 45 of the Civil Air Regulations governing irregular and contract carriers.

▶ **C-46 Eyed**—Initially, CAA and CAB had investigated the possibility that the C-46 aircraft had faults which made it undesirable for use as a passenger transport. Last year, 86 of the 97 passengers killed in the crash of large domestic nonscheduled aircraft were aboard C-46s.

It was found, however, that there was no basis for black-balling the C-46. What seemed likely was that nonskeds shifting over from DC-3s to high-capacity C-46s may have had inadequate facilities for maintaining the latter craft. Further, it has been suspected that some nonskeds having planes on lease from the government or another carrier at a fixed rental per month laid out a minimum of money on upkeep of the ships.

When the planes reached the time for major overhaul, they could be turned back to the lessor. Certificated airlines have long complained that savings on depreciation and maintenance expense not legitimate economies—permitted a number of nonskeds to conduct their cut-rate services.

▶ **Staff Inadequate**—CAB made its latest move after CAA reported that its safety staff was inadequate to supervise the nonskeds effectively. One CAA problem was that when its agents went to inspect a nonsked the carrier would claim that it had just shifted its base and that its records were elsewhere.

New amendments to Part 42 of the Civil Air Regulations will focus responsibility for maintenance and operation of nonscheduled aircraft. The user of large transports will be required to have exclusive operational control of all his craft for at least a six-months period.

Heretofore, an operator who had long-term control of only one large transport could use any additional planes if they were listed in the company's operating certificate and if, at the time of such listing, they were found safe for the service to be offered. However, CAA discovered that where the same transport is listed in the operating certificate of more than one nonsked (a frequent occurrence) it is practically impossible to fix responsibility for poor maintenance or other airworthiness deficiencies.

In the future, no transport of DC-3 type or larger may be listed simultaneously in the air carrier or commercial operating certificate of more than one company. When an operator no longer has exclusive operation control of a transport he must report the fact to CAA so that the plane can be removed from his operating certificate.

▶ **Base Changing Curbed**—The amended regulations provide that no nonsked may change his principal operations or maintenance base without prior CAA approval. This will prevent an air carrier from avoiding CAA inspection of his records by asserting that he has just shifted his operations to another place. It will also enable CAA to determine whether the nonsked has necessary facilities at the new location before operations are started from that point.

All irregular air carrier operating certificates and commercial operator certificates issued prior to July 1, 1950, will expire no later than June 30, 1951. And all certificates issued after July 1, 1950, will be limited in duration to one year.

MILITARY ROOFTOP AIRPORT

The Army has instituted helicopter courier service between downtown Seattle, Washington and Ft. Worden, 30 min. apart by copter but 3.5 hr. apart by ground and water transportation. This Bell H-13, assigned to the Second Engineer Special Brigade at the fort, lands atop a concrete warehouse at the Seattle Port of Embarkation carrying priority military papers. Flags are fastened to roof obstructions. The circular white "target" guides the pilot. Eyes fixed to roof secure copter after landing.

This provision is designed to provide a specific recurrent period for proving qualification for an operating certificate. Such a rule is deemed necessary because operators who show their ability to perform air carrier operations safely at the time of original issuance of an operating certificate often fail to maintain the necessary facilities and personnel thereafter.

Significantly, CAA may initiate its re-inspection program for renewal of a nonsked's operating certificate at any time, rather than wait until the end of the year.

CAB's new regulations require the nonsked to have appropriate economic authority to engage in air transportation as a condition to the issuance of an air carrier operating certificate by CAA. This provision permits easy revocation of safety operating authority when economic authority has ceased.

▶ **Westair Hit**—Prime individual target of CAA and CAB is Aviation Corp. of Seattle (doing business as Westair Transport), whose C-46 crashed in the Atlantic Ocean June 5, killing 28 Puerto Rican farm laborers. CAA, which has been seeking revocation of the company's operating certificate since last October, has added new charges of safety violations to the long list filed last fall.

Specifically, CAA alleges that the Westair C-46 was overloaded on its fatal flight from San Juan to Wilmington, N. C. Federal investigators at the accident hearing said the C-46 weighed 50,535 lb. at takeoff—2535 lb. more than the 48,000-lb. maximum.

The amended complaint states that the Westair C-46 did not carry sufficient fuel to fly to Wilmington and then to the most distant alternate airport designated in the flight plan (Raleigh-Durham, N.C.), and thereafter to cruise for at least two hours in accordance with Civil Air Regulation requirements. CAA said Westair had operated other flights during April and May, 1950, without carrying a sufficient fuel reserve.

In addition, CAA charged that Westair violated regulations by:

- **Failing to familiarize** passengers with the location and use of emergency equipment;
- **Utilizing cabin attendants** not proficient in their duties;
- **Using pilots** who had not been qualified over the San Juan-Wilmington route by a company check pilot or CAA safety agent;
- **Moving** its principal operations base from Seattle to Miami, from Miami to Millville, N. J., and from Millville to Wilmington, N. C., without giving prior written notice to CAA;
- **Failing to maintain** at its principal operations base required records of aircraft utilized by the company in air transportation.
- **Operating flights** with a pilot-captain who did not hold a valid Airline Transport Pilot rating;
- **Refusing to return** its irregular air carrier operating certificate to CAA after it had been notified that the certificate had been placed under emergency suspension.

CAA said that because of these actions Westair demonstrated that it does not possess proper qualifications to hold an irregular air carrier operating certificate and is not capable of conducting operations in compliance with Civil Air Regulation requirements. Simultaneously, CAA issued orders restricting the routings which nonsked twin-engine aircraft may follow between Puerto Rico and the U. S.

▶ **Earlier Complaint**—In its original complaint last October against Aviation Corp. of Seattle, CAA alleged that the nonsked failed to report a number of aircraft malfunctionings and defects and had failed to report the corrective action taken. CAA said the carrier had been guilty of violating safety regulations over a long period of time, "indicating careless and reckless operation of aircraft so as to endanger the lives of others."

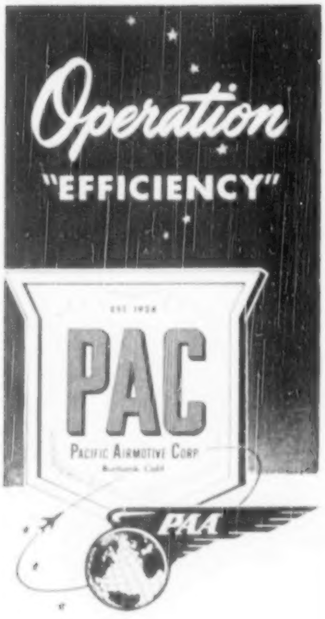
The federal agency said the carrier during 1948 and 1949 operated aircraft in the U.S. and Alaska without adequate de-icing equipment and with pilots who had flown beyond legal flight time limits, carried passengers and cargo when the freight was loaded in such a way as to block off emergency exits, failed to secure cargo adequately or provide safety belts for passengers, and failed to provide an approved CAA flight manual.

AA Posts Record First-Half Revenues

American Airlines' operating revenues hit record levels during the first six months of 1950, but the carrier's net profit was below the same period last year, when federal income taxes were substantially reduced by carried forward losses sustained in 1948.

Operating profit in first-half 1950 was $5,161,590 against $4,214,397 last year. After provision for $2,150,000 in federal income taxes, the net on June 30, 1950, was reduced to $2,478,544. Federal income taxes during the first six months of 1949 came to only $90,000, enabling AA to show a $3,315,989 net for that period.

▶ **Traffic Gains**—Total operating revenues increased $2,013,000 over last year as revenue passenger mileage rose 4 percent, freight traffic gained 7 percent, express traffic soared 20 percent



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and mail volume remained about the same. Operating costs were up $1,056,000, with flight expense gaining substantially to overbalance a slight decline in ground expense.

Both revenue and passenger traffic increases would have been somewhat larger but for the strike of maintenance personnel the first 11 days of March.

American said its transcontinental coach service has been "quite successful" from both a traffic and profit standpoint, although the volume of coach business is still only a small part of overall business. Significantly, AA's $2-million gain in operating income over the first six months last year came despite a small decline in mail revenues.

Nonskeds Seek Larger Pacific Role

Nonscheduled airlines are touting their twin-engine C-46s as potentially important contributors to the trans-Pacific airlift to Japan.

The Independent Air Carrier Conference of America, Washington, D. C., is already acting as coordinator for domestic irregular cargo flights under contract to the military. These trips are made on a demand basis, many of them being used to feed cargo from eastern U.S. to the West Coast for transhipment by air to the war area.

But nonskeds think they could be even more directly useful in increasing the efficiency of the overseas airlift. Their proposals, however, run counter to the military's policy of regarding all twin-engine equipment as non-strategic insofar as long-range transport operations are concerned.

▶ **Loads Compared**—Airline C-54s now under contract to the military for the run to the Orient can haul only about 12,500 lb. (instead of their 18-20,000 lb. capacity) if they operate over the mid-Pacific route via Hawaii. If they fly via the Aleutians (where shorter hops are involved), they can carry around 15,000 lb.

The nonskeds offer to haul capacity 12,500-lb. loads in their C-46s as far as Shemya in the Aleutians. There the high-priority cargo could be put on C-54 merry-go-round flights to Japan.

C-54s now require up to six days to make a roundtrip to the war area, depending on the route taken, destination and other factors. But the Shemya-Japan roundtrip would require only two days, thus doubling or trebling the scarce C-54s' usefulness, according to the nonskeds.

▶ **Planes Available**—Nonscheduled operators have about 77 C-46s, most of them on lease from the Air Force. Altogether the USAF has about 100 C-46s on lease to regular airlines, scheduled all-cargo carriers and the irregulars. Less than 40 USAF C-54s are on lease to commercial operators.

Irregular carriers also hope to handle increased commercial traffic as a result of scheduled airline planes being diverted to the Pacific. Nonskeds say that commercial cargo which would normally have gone from the Pacific Northwest to Alaska by air is moving by boat. They feel CAB should give them special exemptions to operate regularly to handle such business.

Merger Opponents Continue Fight

Opponents of the recently approved Pan American Airways acquisition of American Overseas Airlines are still hoping the courts will upset the merger.

TWA and a group of AOA employes (Brian O. Sparks et al) fighting the sale have asked the U.S. Court of Appeals for the Second Circuit to review the case. Former Civil Aeronautics Board Chairman James M. Landis, representing the AOA employes, contends CAB acted illegally when, at President Truman's direction, it reversed itself and approved the merger.

▶ **Authority Questioned**—Originally, the Board voted 5 to 2 against the sale, and President Truman endorsed the decision. Landis contends CAB's decision did not require White House approval. And if it did, he argues, CAB erred

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in not issuing its first order rejecting the merger, since this decision had Presidential approval for a short time.

Further, Landis declared, even though the President has authority to approve or disapprove transfer of a certificate authorizing foreign or overseas service, he is not empowered to direct CAB to make extensive changes in the route pattern as a condition to approving the deal. (By White House direction, CAB not only approved the sale but ordered Pan American certificated to Paris and Rome, and TWA to London and Frankfurt, Germany.)

On top of all this, Landis questioned whether the PAA-AOA merger pact was actually in effect when CAB adopted its second order. He said the agreement extending the merger deadline was not filed officially with CAB until after the pact had expired.

May Earnings Up

Highly profitable operations during May have given the domestic trunklines' 1950 earnings prospects a rosier tinge.

At the end of April, the 16 carriers showed a $1,158,000 operating loss, compared with a $527,000 deficit in the first four months of 1949. But May 1950 operating profits totaled $5,454,000, compared with $3,936,000 in the same month last year.

Result was a $4,296,000 operating profit for the first five months of 1950, compared with $3,409,000 in the 1949 period. The domestic trunklines' revenue passenger mileage in May jumped 15 percent over last year.

Idlewild GCA

Over a half-million dollars worth of Gilfillan precision approach and airport surveillance radars are being installed by CAA at Idlewild International Airport, N. Y.

The installation is expected to be commissioned about the middle of September. It is the Type I equipment also installed at LaGuardia Field. CAA will furnish five maintenance and five operations personnel. Construction work and the cable and duct systems will cost $49,454, with the electronic gear and installation costing over $550,000.

Recommend Denial Of Michigan Routes

Applications of three airlines to operate one-carrier service between Detroit and Hancock-Houghton on Michigan's upper peninsula should be denied, according to Civil Aeronautics Board Examiner R. Vernon Radcliffe.

Companies involved are: Wisconsin Central Airlines and Turner Airlines, both certificated feeders, and Nationwide Airlines, which has been operating intrastate flights in Michigan since 1947. Radcliffe said that besides Nationwide's direct service, Wisconsin Central and Capital Airlines either provide or are capable of providing good connections between Michigan's upper and lower peninsulas.

The examiner recommended that CAB find that Nationwide had conducted unauthorized interstate operations between Michigan's upper and lower peninsulas by flying over part of Wisconsin. However, a slight adjustment in the carrier's route apparently would make it strictly intrastate.

SHORTLINES

▶ **American**—Is offering combination air-steamship vacation trips in cooperation with D & C Lake Lines, which operates cruises on the Great Lakes originating at Buffalo and Chicago.

▶ **American Central Air, Inc.**—The Miami company has asked CAB for a certificate to carry cargo over two routes between Miami-Tampa and Barranquilla, Colombia.

▶ **Capital**—Was slated to place its first

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56-passenger Connie in service last week on the Washington-Chicago run.

▶ **Civil Aeronautics Board**—Has disapproved agreements between Trans American Airways, Viking Airlines, Robin Airlines, Arrow Airways, Airline Transport Carriers, Inc., Associated Airways and Air America relating to interline ticketing procedures. The Board said the facts appeared to facilitate integration or rotation of the nonskeds' flights through ticket agents, resulting in the offering of illegal regular services.

▶ **Continental**—Has replaced hostesses with male flight agents on four local flights to facilitate the handling of increasing cargo and mail traffic. . . . Company flew 19,557 passengers in June, highest since Sept. 1946, and up 12 percent over June, 1949.

▶ **Eastern**—Has complained to CAB against National Airlines' tariff proposing inauguration of daytime New York-Miami coach service starting Aug. 5.

▶ **Hellenic Airlines**—A DC-4 purchased from American Overseas Airlines is being reconditioned by Texas Engineering & Manufacturing Co., Dallas, and will be flown to Europe for use on the Greek carrier's route between London, Paris, Rome, Athens and Cairo.

▶ **International Air Transport Assn.**—Dr. George P. Baker, Harvard University transportation professor and former CAB vice chairman, will present the annual IATA paper at the association's sixth annual general meeting at San Francisco on Oct. 19. Topic will be "Looking ahead in international transportation."

▶ **Oxnard Sky Freight**—CAB has ordered the California nonsked to show cause why its letter of registration as an irregular operator shouldn't be revoked for knowing and wilful violations of the Civil Aeronautics Act. Company is alleged to have operated with excessive frequency and regularity between New York and Miami, between Los Angeles and San Francisco, and between the West Coast and New York.

▶ **Parks Air Lines**—Has filed a complaint against the U. S. Postmaster General for his failure to designate one or more of the carrier's St. Louis-Chicago feeder schedules as mail routes. Parks also wants CAB to grant it a temporary mail rate. The Board refused to authorize inauguration of Parks' service, which began June 21.

▶ **Resort**—CAB has denied the carrier's request for an exemption to operate between Southern Pines-Pinehurst, N. C., and New York, Washington, Philadelphia and Miami through Oct. 31.

▶ **Sabena**—Last week planned to take delivery in New York on two Bell Model 47 helicopters which will be used for mail pickup and delivery service out of Brussels. The copters will be shipped to Brussels via Sabena cargo plane.

▶ **Transocean**—Has been authorized to continue carrying construction workers between the U. S. and Okinawa until Aug. 31, but may have to discontinue the trips thereafter. CAB indicated these flights, conducted since 1947 as a contract service, are actually common carriage. The Board said Northwest Airlines and Pan American serve Okinawa, and that TAL had not proved the need for additional service.

▶ **Trans-Texas**—The feeder's certificate has been amended to authorize service between Fort Stockton, Tex., and El Paso via Pecos.

▶ **TWA**—Has taken delivery on its first two Martin Model 2-0-2A transports.

▶ **United**—Broke all passenger and cargo traffic records in first half 1950. Revenue passenger mileage was up more than 5 percent, express 30 percent, freight 15 percent and mail 9 percent over the same period last year.

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▶ Wiggins Airways—The New England feeder has asked for route extensions from Providence, R. I., to New York via Newport and Westerly, R. I., and Southampton-Riverhead and Islip, N. Y.; and from Adams-North Adams, Mass., to New York via Pittsfield, Mass., Danbury, Conn., and White Plains, N. Y. Company also wants its certificate made permanent or extended for five years. Wiggins operates Cessna T-50s to about 20 towns on its Boston-Albany links.

CAB SCHEDULE

July 31—Hearing on amendment of Alaska Airlines' Alaskan route certificate. (Docket [illegible])

Aug. 2—Hearing on CAB's investigation of unauthorized cargo operations by American [illegible], Inc. (Docket [illegible])

Aug. 7—Resumption of hearing on enforcement proceeding against Trans American Airways, Great Lakes Airlines, [illegible] Airways, Edward Ware Tabor and Sky Coach Airtravel, Inc. (Docket [illegible])

Aug. 9—Hearing in West Coast Airlines-Southwest Airways merger case. (Docket [illegible])

Aug. 14—Resumption of hearing on renewal of Southwest Airways' feeder certificate and service suspension at certain United Air Lines points in the area. (Docket 3718 et al.)

Aug. 16—Resumption of hearing on renewal of West Coast Airlines' feeder certificate and service suspension at certain United Air Lines points in the area. (Docket 3718 et al.)

Aug. 17—Prehearing conference on Panagra mail rate case. (Docket [illegible])

Aug. 18—Hearing in proposed case of additional California-Nevada service. (Docket [illegible] et al.)

Sept. 1[illegible]—Hearing in Lehman Brothers' interlocking relationship case involving holdings of four airline [illegible]. (Docket [illegible] et al.)

Sept. 11—Hearing in enforcement proceeding involving interlocking relationships between Atlas Airways, Inc. and [illegible]. (Docket [illegible])

Sept. 11—Hearing on applications of Aerovias "Q" and Compania Cubana de Aviacion for Havana-Washington-New York foreign air carrier permits. (Dockets [illegible] and [illegible])

Sept. 18—Hearing on TWA and American Overseas Airlines requests to suspend service at Philadelphia on [illegible] routes. Postponed from Aug. 7. (Docket 4229 et al.)

Sept. 21—Prehearing conference on American Overseas Airlines' mail rate. (Docket [illegible])

Sept. 26—Hearing on Mid-Continent Airlines application to have its Route [illegible] certificate (Tulsa-Houston) made permanent. (Docket [illegible])

Oct. 2—Hearing on renewal of Frontier Airlines' feeder certificate and service suspension at six United Air Lines stops in the area. Postponed from Sept. 18. (Docket [illegible])

Oct. 9—Hearing in Latin American Air-freight case. (Docket [illegible] et al.)

Oct. 1[illegible]—Hearing on Los Angeles Airways' application for renewal of its helicopter temporary certificate and for additional authority to carry passengers. (Docket [illegible])

Jan. 8, 1951—Hearing in Big Four mail rate case and CAB investigation of [illegible] economy and efficiency. (Docket [illegible] et al.)

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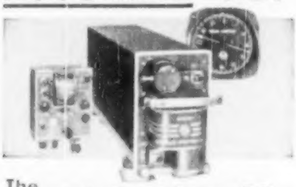

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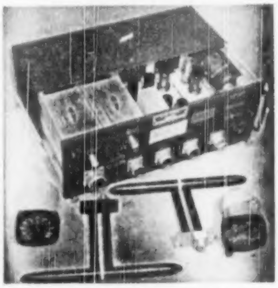

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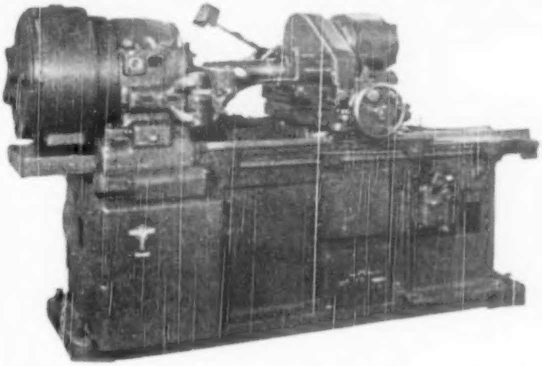

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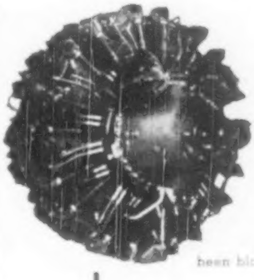

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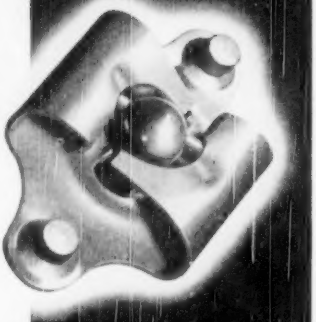

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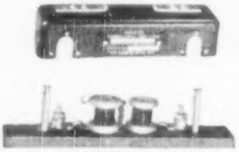

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The analysis starts out on a basic level of objective and plan, and follows through progressively with operation, organization, personnel factors, standards, records, equipment, measuring instruments, test equipment, receiving, fabrication and assembly, salvage, shipping, tooling, experimental and lab details, typical inspection job evaluations, and typical inspection specifications. Photos, sketches, forms and organization charts supplement the text.

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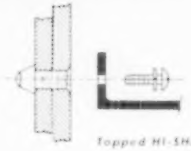

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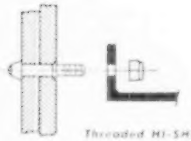

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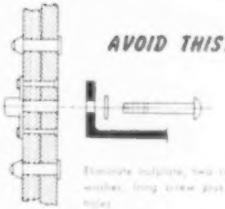

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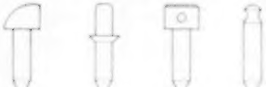

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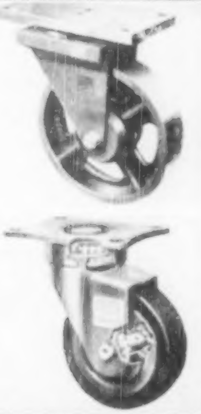

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EDITORIAL

Overselling the Missile

It's time for another warning on missiles. The public is being dangerously misled by the continuing dribble of government press releases on various and isolated missile firings, velocity figures and impressive heights.

The general public impression from this publicity barrage seems to be that push-button warfare is around the corner. Despite five years' time since the war, and a hundred million dollars, it isn't even on paper!

There are a few isolated cases of progress, but in the main they warrant scarce optimism. Progress, if any, has been in some industrial circles, in spite of woefully inadequate direction from Washington. Confusion in government policy is pathetic. Duplication and overlapping in administration of the agencies involved in missile experimentation and development are as serious as great voids that exist between the various projects. But there is duplication in the projects as well.

Sometime soon there must come the inevitable rude and shattering awakening on this subject. Otherwise, the national security is gravely in danger.

Latest publicity last week described the spectacular firing in Project Bumper of a German V-2, which carried a smaller missile, the Wac. The Wac was let loose after the V-2 had been launched.

Purely in a constructively critical mood, let's look at this well-publicized incident realistically. Why is it, five years after the close of the war with Germany, that we are still firing German V-2 rockets in "tests"? In a field as dynamically changing as rockets and missiles, five years should see revolutionary developments and improvements.

As for the Wac, we are informed its payload is about 25 pounds. Most of this has been used for telemetering gear, of course. But even if it wasn't, how much good would this payload be against the Russians, or the Koreans, or anybody? As one of our engineer friends puts it, 25 pounds is not payload enough to wage war against mice. Nor would it accommodate a nuclear warhead, either.

In the public interest, let the following highly important statements—which we invite any responsible public official anywhere to question or deny—be set down here for the record:

1. The United States does not have any intercontinental missile weapon. We concede that there is one 5000-mile subsonic turbojet pilotless aircraft which could be ready for tests soon. Two years more, under the recent and current schedule, might see some ready for service. Two years more could also see a Russian anti-missile rocket ready.

2. The United States does not have any long-range rockets. We have some short-range types—but only in design stages—and one or two that might reach longer distances with the aid of ramjets for cruising. But there is nothing in the 5000-mile class. There is nothing even in the 1500-mile class.

3. The United States does not now have in being any service-tested or service-accepted missiles of any type or range. What we do have are assorted and sundry test vehicles, or limited quantities of missiles that could, with time-consuming rework, become operational. But we do not have any missiles with warheads that are yet on a stand-by basis. Some missiles are actually in or about to go in production, but they are all test models. None is intended to do any serious combat work.

Why, after some 100 million dollars of expenditure is this so?

One reason, we feel, is that Ordnance holds that missiles are merely artillery without guns. So we are getting World War I and World War II artillery thinking.

And the Air Force conceives missiles as merely airplanes without the need for pilots. So we get World War I and World War II air force thinking.

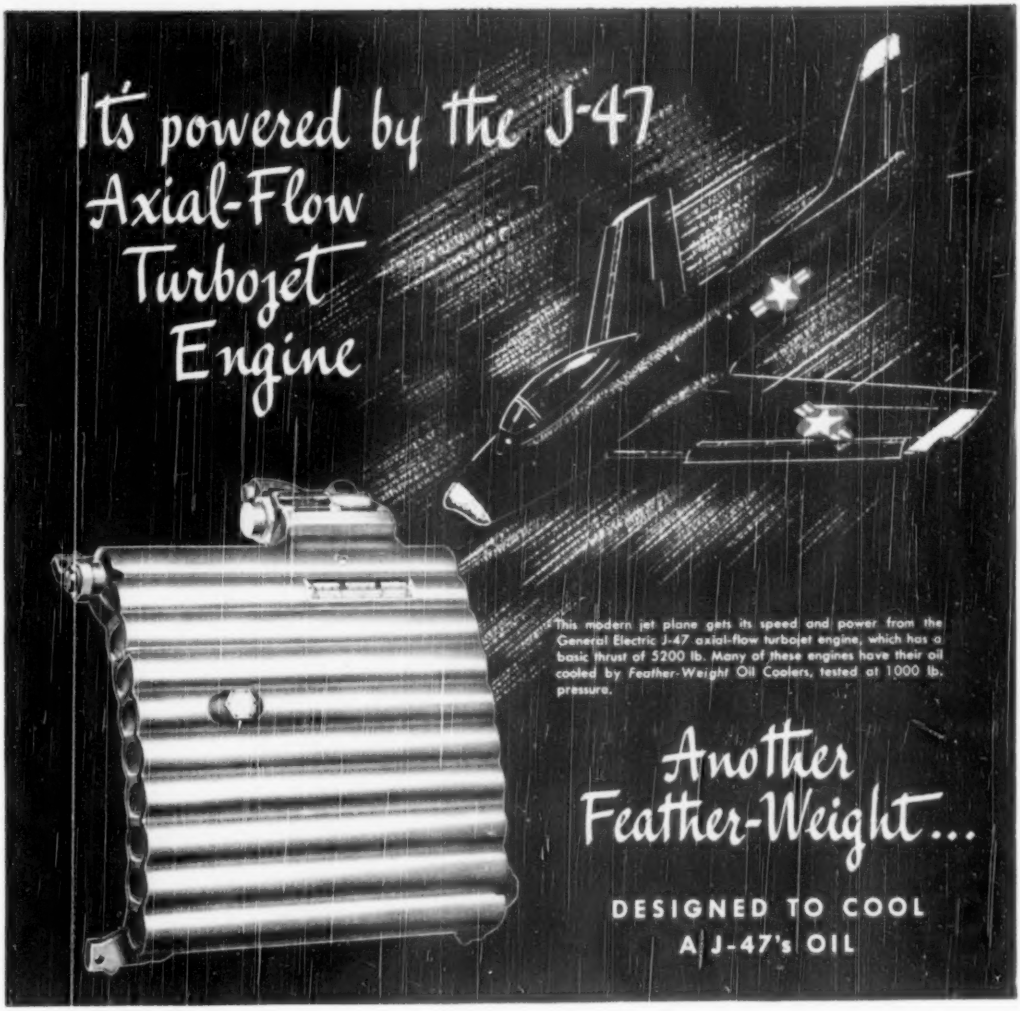
The same arguments for divorcing the Air Corps from the Army to set up a separate air force now apply to splitting off missile design, experimentation and development from the government administrators whose first love and first responsibility are to either artillery or airplanes. The missile is neither.

Somebody should start cleaning up the woeful confusion, set up a directing agency without the preconceived prejudices and theories of any other group, and set to work with open minds and the realistic goal to produce and produce and produce.

That is how the Germans organized their missile forces at Peenemunde.

All the production lines in the world turning out "test" missiles will never help us win a war.

—ROBERT H. WOOD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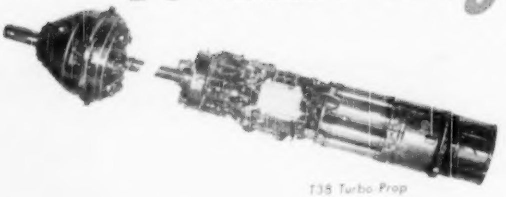
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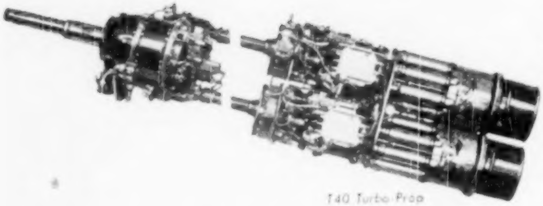
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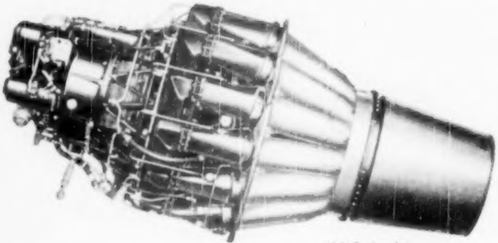
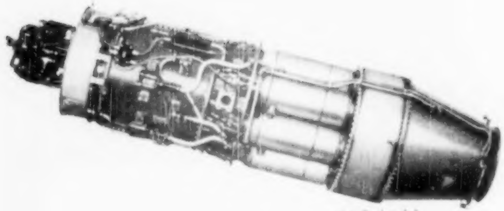

J33 Turbo-Jet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